# JOURNAL OF ELECTRICITY

## POWER AND GAS

**Devoted to the Conversion, Transmission and Distribution of Energy**

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P. P. I. E. ENGINEERING CONSTRUCTIONAL FEATURES.

ELECTRICAL STANDARDS IN SAN DIEGO
BY L. M. KLAUBER.

ELECTRICAL JOBBERS' MEETING.

CREATIVE SALES WORK BY JOBBERS.
BY T. E. BURGER.

NORTHWEST ELECTRIC LIGHT AND POWER ASSOCIATION CONVENTION.



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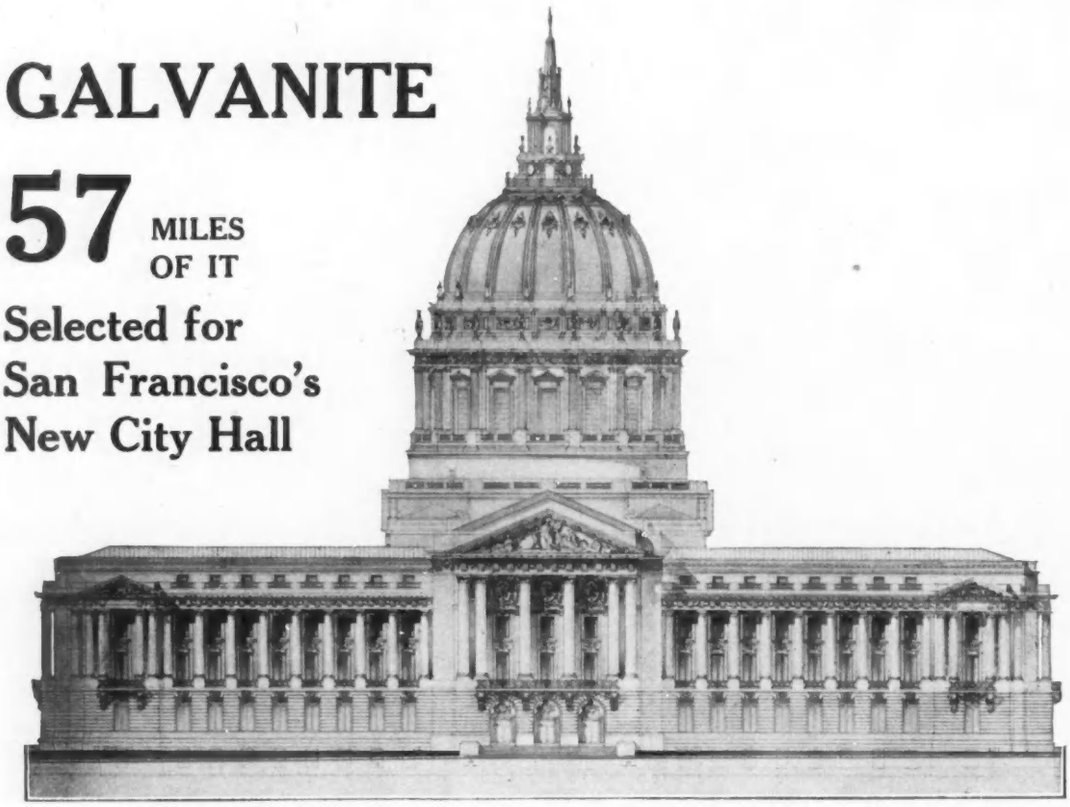
# GALVANITE

## 57 MILES OF IT

## Selected for San Francisco's New City Hall



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Bakewell & Brown, Architects — Hunter & Hudson, Engineers. Electrical
Installation by F. E. Newberry Electric Co.

Because of the ability to withstand the rigid test prescribed.

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Member Society for Electrical Development—"DO IT ELECTRICALLY"

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POWER AND GAS
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VOLUME XXXIII SAN FRANCISCO, OCTOBER 3, 1914 NUMBER 14

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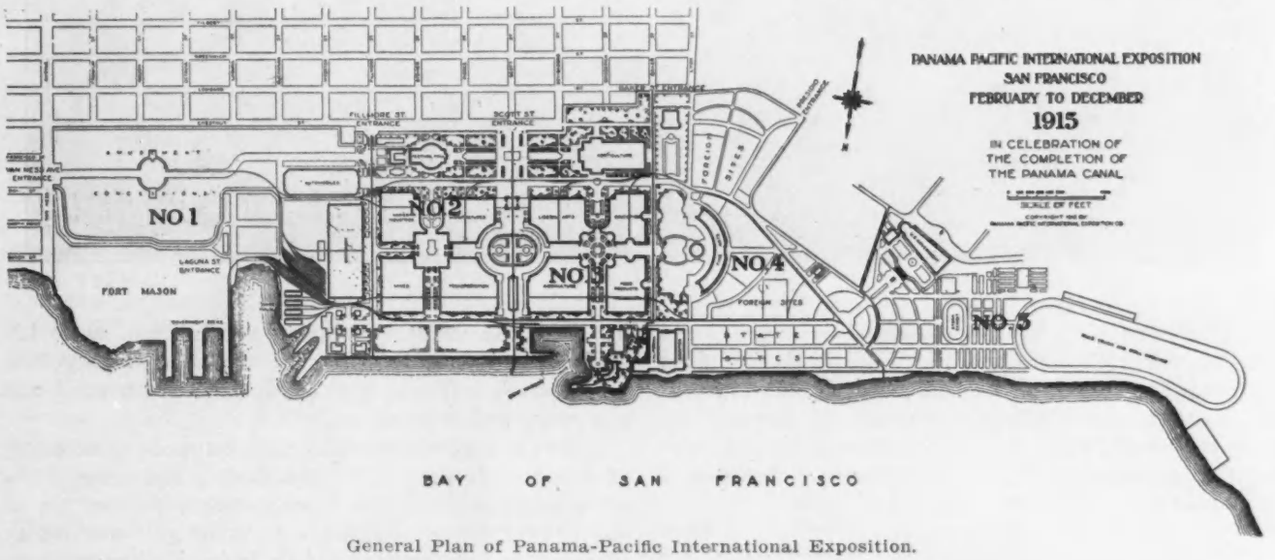
# P. P. I. E. ENGINEERING CONSTRUCTIONAL FEATURES

From an engineering standpoint an exposition may be said to have three periods—the constructional, the instructional and ultimately the destructional. The constructional period of the Panama-Pacific International Exposition is almost completed. The instructional will begin when the Exposition is opened at San Francisco on February 20, 1915, and the regrettable, but inevitable destructional will commence after the Exposition closes in December of that year.

The celerity with which this construction has progressed, now being practically finished months before the actual opening of the Exposition, is largely to the credit of the Department of Works, a most remarkable engineering organization under the supervision of the Director of Works, Mr. H. D. Connick.




General Plan of Panama-Pacific International Exposition.

The constructional period has been essentially a time of supplying utilities for a great city, the "City of Dreams" which engineering genius has made a living reality. Here the dreams of architects, sculptors, artists and inventors have been materialized. But greater than the artists' touch and loftier than the architects' towers stands forth the noble purpose of this mighty world movement for the building of a tomorrow, the coronation of service.

The utilities to be supplied in a few brief months were those that other modern cities have been years in acquiring, roads, buildings, sewers, fire-protection, water, gas, electricity, transportation, steam and compressed air service.

The Division of Works is composed of seven departments, each made up of the necessary number of bureaus, designated in alphabetical order. The departments and bureaus are briefly as follows:

The Department of Construction has charge of all structural matters and construction, contracts and estimates, and is in charge of the Assistant Director of Works, A. H. Markwart. The following bureaus cover the work in this department: (A) Structural Engineering; (B) Building Construction; (C) Specifications; (D) Estimates; (E) Memorandum Accounts; (F) Lands; (G) Medical.

The Department of Civil Engineering is concerned with the filling and grading of the Exposition site, the design and construction of railways, roads, sewers and water supply, and the supervision of all surveying and day labor. The following are the bureaus: (H)

Engineering Construction; (I) Water Supply and Fire Protection; (J) Railways.

The Department of Mechanical and Electrical Engineering has supervision of power and light distribution and has one bureau: (K) Illumination.

The Department of Architecture handles all matters relating to architecture, with one bureau: (L) Design.

The Department of Landscape Engineering is concerned with general landscape design, moving and transporting of trees and the planning of lawns and horticultural features.

Two other departments, Color and Decoration, and Sculpture, complete the list.

### A Picturesque Exposition Site.

No site could have been selected that offered greater advantages for displaying constructional features, or that could be made more picturesque than that upon which the Exposition is built. Fronting on San Francisco Bay for a distance of two miles, and just inside the Golden Gate, the Exposition site offers a beautiful perspective that would be hard to improve. On the three other sides the grounds are surrounded by picturesque hills, the whole constituting a vast natural amphitheater whose 625 acres are distributed as follows:

| | Acres. |
|---|---|
| Concession district | 69.2 |
| Railway yards, wharves and docks | 17.1 |
| Exhibit palace site proper | 217.3 |
| Street railway terminals | 2.3 |
| State pavilion sites | 42.3 |
| Foreign pavilion sites | 49.7 |
| Aviation field drill grounds and racetrack | 37.7 |
| Livestock section | 24.3 |
| Life saving station | 1.1 |
| Proposed U. S. Government exhibit | 12.7 |
| Unappropriated at westerly end | 10.3 |
| Total area for definite purposes | 484.0 |

The exhibit palaces occupy the central portion of the site. The main group consists of the following: Education and Social Economy, Food Products, Agriculture, Liberal Arts, Manufactures, Transportation, Mines and Metallurgy and Varied Industries. These are grouped about the Grand Court of Honor, 500x900 ft. in size. The great Tower of Jewels, 435 ft. in height, adorns the central front of the group and forms the centerpiece of the Exposition architecture. The main buildings are separated by open spaces not exceeding 150 ft. This is an economic feature not adopted at previous expositions, where the spacing ran from 300 to 400 ft.

The Machinery Hall is set to the east, Fine Arts to the west, and Horticultural and Festival Halls to the south of the group.

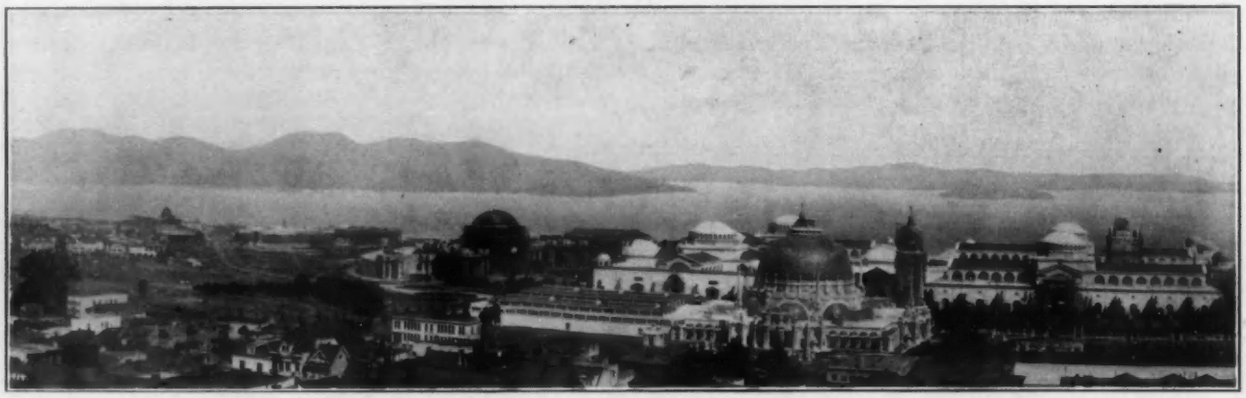
The Zone, containing the amusement concessions, is at the east end of the grounds and the state and foreign buildings at the west.

**Dimensions and Costs of Buildings.**

| Buildings. | Size ft. | Area Sq. ft. | Volume 1000 cu. ft. | Total Cost. |
|---|---|---|---|---|
| Agriculture | 579x639 | 328,633 | 20,634 | $425,610 |
| Education | 394x526 | 205,100 | 14,053 | 304,263 |
| Festival Hall | 276x386 | | | 270,000 |
| Fine Arts | | 126,000 | | 580,000 |
| Food Products | 424x579 | 236,690 | 15,609 | 342,551 |
| Horticulture | 300x660 | 195,000 | | 341,000 |
| Liberal Arts | 475x585 | 251,300 | 16,038 | 344,180 |
| Machinery | 367x967 | 369,600 | 38,000 | 659,665 |
| Manufactures | 475x552 | 234,000 | 15,650 | 341,069 |
| Mines and Metallurgy | 451x579 | 252,000 | 16,199 | 359,445 |
| Transportation | 579x614 | 314,000 | 20,413 | 481,677 |
| Varied Industries | 414x541 | 219,000 | 14,648 | 312,691 |
| | | | | $4,762,151 |

### Foundation Footings.

A large portion of the site is filled ground underlaid with clay and blue mud, green sand and clay, and hardpan, the latter varying in depth from 30 to 120 feet. The soil under the area not filled in is yellow beach sand, soft clay and sand, hard green sand and clay, and yellow hardpan.



Panoramic View of Panama-

As the surface showed only a supporting strength of 400 pounds per sq. ft., prohibiting the general use of spread footings, pile footings were decided on as support for all the buildings so as to give uniformity of construction, greater safety in case of earthquake and economy of cost.

The piles were from 16 to 75 ft. in length and were driven to a penetration of one inch at the last blow of the driver, each pile being assumed to carry a load of 20 tons.

The floors in the buildings are supported independently of the walls. Live loads on floors are estimated at 100 lb. per sq. ft. in all the main group of exhibit palaces with the exception of Mines and Metallurgy, which is 150 lb. and Festival Hall, where the floor loads are estimated at 125 lb. The assumed weights are 3 lb. per board foot for lumber, 5 lb. per sq. ft. for plaster composition and 20 lb. per sq. ft. or 100 lb. per cu. ft., for cast composition.

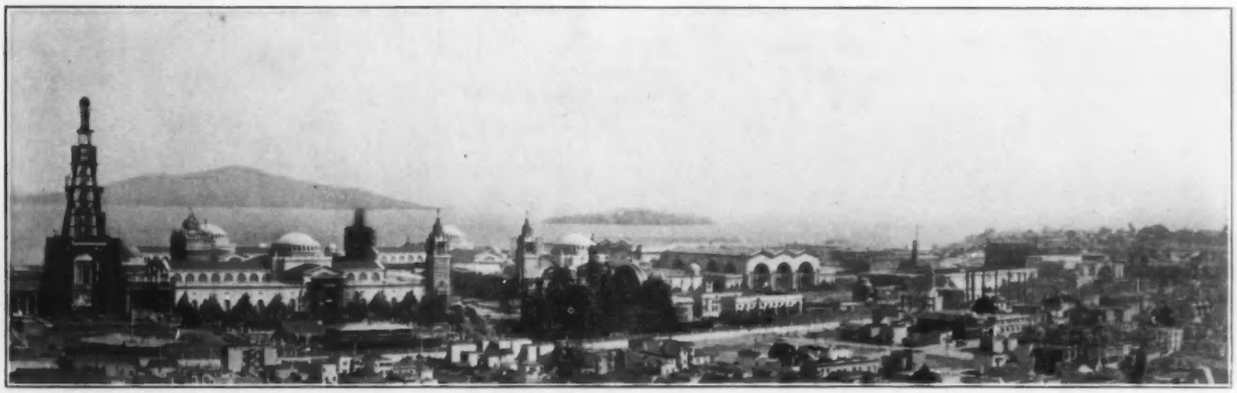
### Types of Construction.

The standard method of construction, unless a steel frame is used, is a timber frame carrying a wall built of wooden studs and covered with sheathing and a special composition in imitation of marble. The ex-

terior walls are covered with a composition of specially prepared gypsum, colored at the factory according to formulas furnished by the Exposition company. Where cast forms are not used, plastic composition is applied direct to the grooved sheathing.

The roofs consist of 1 in. dressed ship lap supported on roof joists or rafters and purlins. The covering is a prepared roofing with an asbestos top sheet, cemented to a layer of roofing felt. The surface is covered with a fire retarding paint in colors to correspond with the general color scheme. This style of roofing affords greater protection from fire than plans followed at previous expositions. Skylights will utilize 20 per cent of roof surface and are glazed with ribbed wire-glass.

The 60 acres of gardens, with their brilliant color display afforded by many flowering shrubs and plants, have required 50,000 cu. yds of loam and 16,000 cu. yds. of fertilizer.



Pacific International Exposition.

The maximum demand for fresh water has been estimated at 3,500,000 gallons a day but a rate of flow has been designed one and a half times as great, to guard against any contingency which may arise. A booster pumping station will assist in keeping a proper pressure and a reservoir of 500,000 gallons in the Presidio provides an auxiliary supply.

The distribution system comprises 4, 6, 8, 10 and 12 in. mains parelleling the high pressure water supply system, so that secondary and primary fire protection will be available in all parts of the districts covered with buildings. All main exhibit palaces will be connected to the domestic water supply system by means of 6 in. pipes on each side of the building, and each building will be supplied with water for domestic service, and to which will be attached low pressure standpipes and small hose equipment.

**High Pressure Fire Protection System.**

The primary high-pressure system is available in the concessions district, main exhibit palaces and the state and foreign districts. An automatic sprinkler system is used in the buildings of the main group. There are also open cornice sprinklers for creating a water curtain on the fronts of the buildings.

Especial engineering interest is attached to the methods by which this system was installed by the contractors, The Turner Company of San Francisco. As may be noted from the accompanying ground plan the system is laid out as a loop of 16 in. pipe with chief source of supply through the 20 in. Van Ness avenue main of the San Francisco auxiliary high pressure water system. There is also a 12 in. connection at Fillmore street and two manifolds on the water front for fire-boat connection.

Over 15,000 ft. of 16 in. mains were installed, while the sub-mains and branches consisted of 14,000 ft. of 12 in. mains, 10,000 ft. of 10 in. and 13,000 of of 8 in. This represented a weight of 850 tons of wrought iron pipe, about 60 tons of Dresser couplings, 75 tons of extra heavy cast iron fittings and 60 tons of extra heavy flange gate valves.

It was necessary to set 192 double hydrants in concrete manholes, a hydrant being placed about every 300 ft. on the line throughout the system. Each main exhibit palace was supplied through four 8 in. branches.

The installation of this system was accomplished in six months' time, the crew averaging 120 men, engaged in excavating, refilling, building the necessary cribbing, putting in concrete blocks for valves and fittings at the turns, as well as handling and laying the pipe. On account of the heavy pressure, 450 lb. being maintained for one hour in each section as laid, especial provision had to be made for blocking the turns, a concrete form with a 6 ft. backing frequently being necessary.

The Turner Company also installed the sprinkler system, which is believed to be one of the largest single installations in the world, over 54,000 sprinkler heads having been used for the main group of eight buildings. There were 65 miles of 6 in. to ¾ in. pipe required and 650 tons of fittings, black extra heavy malleable being used for the five and six inch, and galvanized banded malleable for the 4 in., and smaller.

The first riser was put in on April 13th, and the contract was completed on September 15th, the crew averaging 100 men, including the superintendent and two foremen, as well as two draughtsmen preparing the working drawings. All pipe was cut from the drawings, five pipe machines being necessary during the progress of the job. On account of the exceedingly low bid, and the necessary time limit, great credit is due to the Turner Company for the manner in which they fulfilled their contract.

The system is capable of supplying 15,000 gal. per minute over an area of 100,000 sq. ft. under a run-

ning pressure of 200 lb. per sq. in. All buildings are at least 130 ft. apart, excepting where joined by courts, in which case, a reinforced concrete fire wall is interposed. Every building is completely equipped with chemical hand extinguishers and 6 chemical engines. Three complete fire stations with latest motor driven apparatus are situated at strategic points, and a complete electrical fire alarm system has been installed, and now constitutes the first working electrical exhibit.

### Paving and Transportation.

There are 4,000,000 square feet of pavement and 700,000 square feet in the formal courts and entrances. The paving is colored, as required by the general color scheme, the macadam roads being composed of red radiolarian chert. The concrete surfacings are colored.

The avenues are from 50 to 80 ft. wide and the paths, 10 to 15 ft. wide. Of the road area, 16 per cent is located over the hydraulic fill but not much settlement is expected, as a concrete base is used.

There are 10 miles of standard gauge track in and about the grounds and terminal warehouses. The tunnel under Fort Mason gives physical connection with the belt railway system and railroad cars can be brought direct into the grounds without having to be loaded on the freight ferries. The freight ferries however will play an important part where lines have their terminals in Oakland, Richmond and Sausalito, as the cars can be landed at the grounds by means of the ferry slips.

A direct passenger ferry system will be maintained between Oakland and the grounds.

In Transportation Palace fifteen tracks, each 500 ft. long, have been built for exhibitors' uses.

No intramural system for carrying passengers about the grounds will be installed, some other form of transportation being used.

### Combined Storm Water and Sewer System.

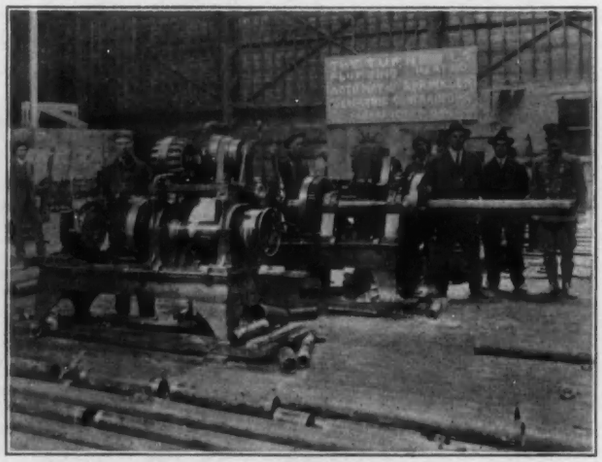
A combined system for collection and disposal of storm waters and sewage is in use in the exhibit buildings and concessions district. The storm waters from the 63 acres of roofs will be carried by sheet metal down-spouts direct to the sewers. There is sufficient slope to the ground in the state and foreign districts to give natural run-offs.

Saturated steam is to be supplied from the Fuels Building, at 150 lb. pressure through a system of steam mains from boilers having a rated capacity of 1500 h.p. Compressed air at 80 lb. pressure will be available.

### Electric Power.

Power is supplied to the main transformer station east of Machinery Hall at 11,000 volts by the Pacific Gas & Electric Company. It is distributed from a primary distribution system; 3-phase 4150 volts a.c., with grounded neutral. As overhead construction was not feasible for the greater part of the grounds it was decided to use an underground conduit system, consisting of Orangeburg fibre linaduct installed in wooden box construction. The concessions section required 1300 trench feet of conduit, the Exhibit Buildings section 2500 ft. and the state and foreign site section, 10,000. Where necessary, the manholes are of concrete, but in many instances they are constructed of timber. The average cost of installing 3 in. duct in wooden box construction was 14 cents per duct ft., including the wooden manholes which were placed at an average of 350 ft. apart. About 100,000 ft. of power cable is to be installed, over 60 per cent now being in place. Most of this cable is 3-phase, 4/0, 11,000 volt, sector type, and the cost of pulling, with the gasoline engine rig employed averages 3c per foot. The cost of splicing this 4/0 sector cable averages $6.33 for labor and $6.35 for material, for each splice made. Where there are a number of splices to be made in one manhole, the cost per splice is somewhat less.

Overhead construction is employed back of the concessions district and in the extreme western part of the grounds.



Pipe Cutting Shop.

Three-phase current is distributed for lighting and power requirements in the main palaces by means of four wire circuits with 115 volts between conductors and neutral. In other parts of the grounds single-phase is supplied by three-wire mains at 115 or 230 volts. Direct current at 125 and 250 volts is available in the Machinery, Mines, Transportation and Manufacturers' palaces.

It is estimated that the average night peak will be 8500 kw., conductors being designed for a maximum of 11,500 kw. to meet the contingency of simultaneous day motor load and ground lighting on dark days.

### Gas.

Gas for both heating and secondary lighting is supplied at 30 lb. pressure through a system of hign pressure mains, consisting of 8 in. and 4 in. loops encircling the ground. Crude oil gas is supplied from one of the plants of the Pacific Gas & Electric Company, which adjoins the Exposition. High pressure gas arcs are to be used for all emergency ground lighting throughout the Exposition. A complete suspension of electric power would leave the grounds well lighted, and gas will also be used for patrol purposes after closing hours.

### Illumination.

The main illumination, however, is to be electrical. All the lighting of the grounds is by the in-

direct flooding system from concealed sources, and nitrogen filled lamps will be mounted on huge standards 10 to 30 ft. high, placed along the walks facing each building, and shielded by banners on all sides except that opposite the facades of the palaces. These standards are constructed of plaster, and make a beautiful ornamental feature by day as well as a useful one by night.

There will be no outline lighting of the buildings, with its consequent glare. The chief architectural lines and ornamentations on the palaces will be emphasized by various colored jewels hung so as to constantly vibrate in the light. A battery of forty-eight 36 in. searchlight projectors is being mounted on a tower perched on an outjutting point in the bay. These will throw intense rays of light through color diffusers, which will separate the flood into fan-shaped rays with all the colors of the spectrum. These rays will be thrown on to the jewelled walls of the palaces, so that they will glow with multi-colored fire. In lieu of the usual fireworks the scintillators will play upon open jets of steam forced through set pieces of pipe which will be caused to assume strange and weird forms by means of a system of valves. A new and convenient form of decorative lamp receptacle has also been developed by the department for all festival lighting. Flat insulated cable will be festooned as needed, and these receptacles clamped so as to make contact wherever desired. Special lamps initating fruits and flowers may thus be used.

The main exhibit palaces are not to be open after dark, and are equipped only with sufficient lamps to care for janitor service. Lights will also be placed back of the windows so as to add to the luminous effect.

The central feature of the night illumination is the Tower of Jewels. Rising in terraces to a height of 435 ft., decorated with statuary and bespangled with myriads of jewels, it is a notable conception and adds greatly to the effectiveness of the illumination scheme. Sixteen projectors have been erected over the Scott street entrance, just opposite the Tower, and largely for illuminating its front. They are equipped with diverging doors, made up of convex lenses, at such angles as to illuminate only the object aimed at and thus have no waste light. Projectors on the roofs of the Liberal Arts, Agriculture, Transportation and Manufacturers buildings light the other sides of the Tower.

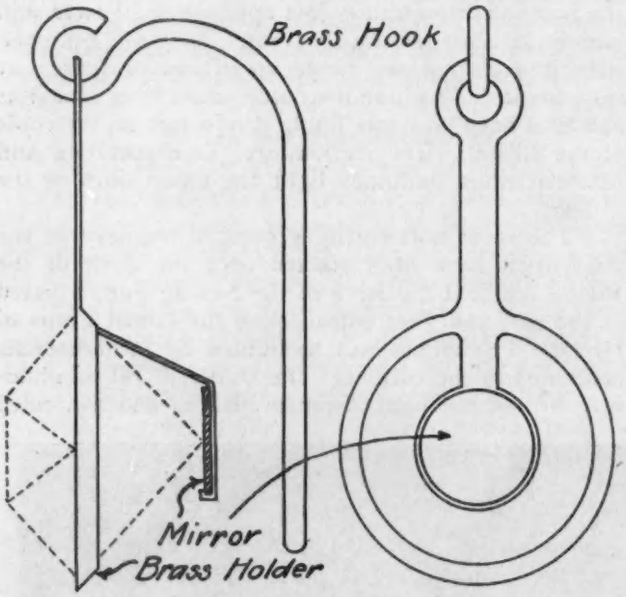
The most noteworthy groups of statuary of the Exposition have been erected over the Arch of the Rising Sun and the Arch of the Setting Sun, situated at the east and west entrances of the Grand Court of Honor. The arches will be lighted by incandescents concealed in the cornice. The statuary will be illumined by colored lights from projectors and concealed incandescents will be used for relief of shadows about the groups.

Searchlight Scintillators for Spectacular Lighting.

In general all statuary will be lighted from two directions, one a strong clear light and a weaker colored one from another, to make a luminous shadow. This idea will give definite depth to an object and bring out clearly the modeling and decorations. Relief lighting will be accomplished by incandescents placed at the base.

Windows over the entrances to all the buildings will be painted glass and the clerestory windows of Deflex glass. Suspended colored incandescent lamps with reflectors and hung ten to fifteen feet back of the windows furnish night illumination.

A moonlight effect will be given the front of Fine Arts building. Four stations equipped with projectors are erected on the west end of the roofs of the Education and Food Products buildings. The projectors are equipped with color screens and diverging




Jewel and Support.

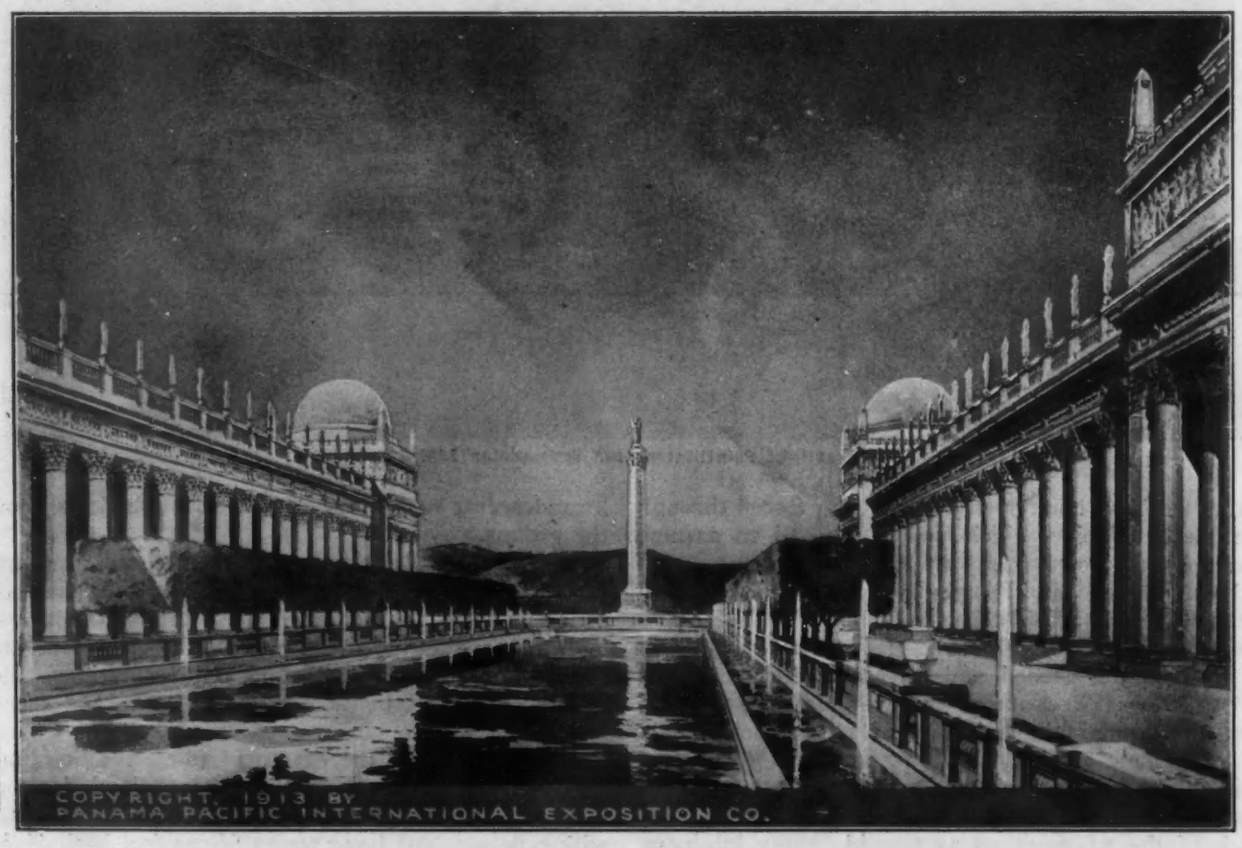
doors. A colonnade 60 feet wide and adorned with statuary runs the entire front of the building and with the lagoon in front should make a beautiful setting for such a scene as will be portrayed.

Lighting of the various courts is largely accomplished by the use of nitrogen lamps mounted on decorative standards. In the Court of the Universe two fluted columns, 38 ft. high and 5 ft. in diameter, of diffusing glass and equipped with high power nitrogen lamps, set at either end of the sunken garden, form the main illumination. This court is surrounded by a classic colonnade with 50 ft. columns surmounted by figures symbolical of the stars. These 110 figures stand 14 ft. high, and the head of each is crowned with a star measuring 4 ft. across and covered with jewels, which will scintillate in the beams crossing the court from projectors in the base of each column.

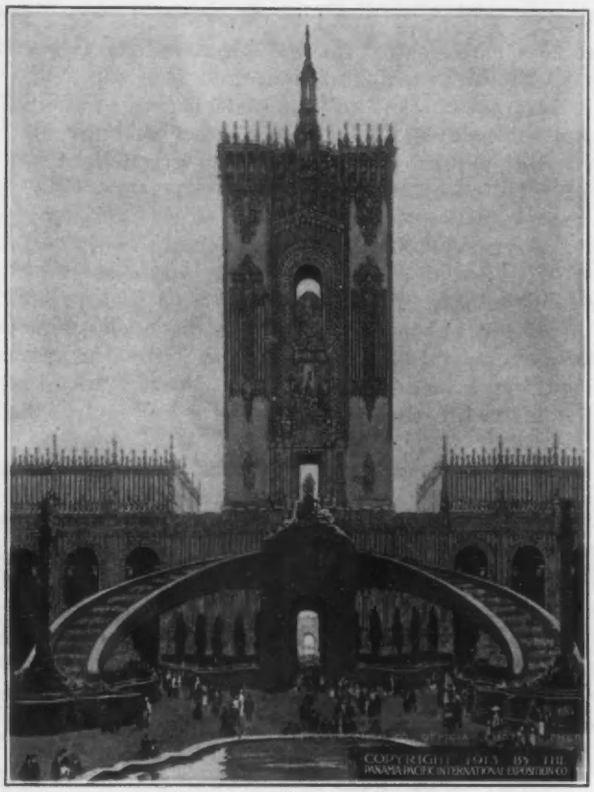
The Court of Abundance, which symbolizes the creation and development of the earth and man from the earliest forms of unicellular life to the latter day higher planes, will also contain a great central basin, at one end of which will be an 18 ft. illuminated glass globe, representing the earth turning on its axis, in the midst of slowly rising columns of steam, and at the opposite end a great disc of glass represents the sun setting at the water's edge. Huge gas flambeaus will surround the central lagoon and line the fireproof walls, along which will be placed columns supporting huge heroic figures of prehistoric men.

The Court of the Four Seasons will be lighted by luminous arcs placed on standards. The great South Garden is lighted by two rows of luminous standards, 55 ft. high which will flank the central fountain.

Ornamental gas standards 35 ft. high with 100 ft. spacings and in symmetrical locations are used in the Zone, the amusement concession area. These are surmounted by Oriental decorations. At a height

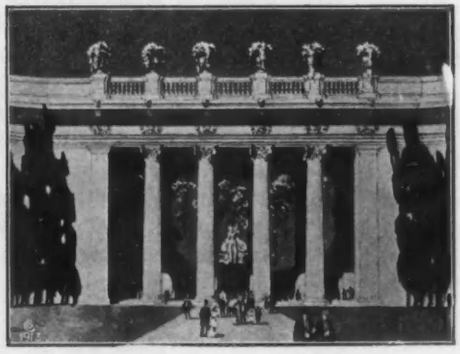



Court of the Universe.




Cascades of Court of Abundance.

of 15 ft. two lanterns are suspended from projecting arms and containing gas lamps. Strings of small lighted Mission bells hung from tree to tree along the avenues of palms will give a festive appearance to the promenades.



Court of Four Seasons.

In the Education, Social Economy, Liberal Arts, Manufactures and Varied Industries, Machinery, Transportation, Agriculture, Food Products and Mines and Metallurgy palaces which present plans contemplate will be closed at night, the scheme calls for illumination of the aisles by means of a trough lined with mirrored reflectors placed in the trusses and by conventional fixtures where necessary.

In the California building the foyer is lighted by electric candles. The ball room which has a flat ceiling will be lighted by a bamboo frame, silk covered ball using tungsten lamps. In the President's dining room is a square skylight with a silken sheet hung beneath it and the light filters through from above. All the lighting fixtures are in Mission style.

**Festival Hall,** which will be used for concerts and festivals, will be lighted by an unique, indirect scheme. A diffusing disc set over a pit in the floor collects the rays from ten projectors placed in the pit, and diffuses the light throughout the auditorium, aided by reflection from the dome which covers the auditorium. The pit is surrounded by a parapet wall about four feet high and it is so set in the aperture that light will be directed from its surface to every portion of the dome. Conical mirrors are also set around and above the disc to catch any stray rays of light. By using colored screens over the lenses of the searchlights vari-colored lighting effects may be easily secured.

The heat generated will be removed by a blast of cold air from the generating system. A stream of water constantly running over the lens of each of the searchlights aids in the cooling. The diffusing disc will be cooled sufficiently by air circulation.

While the lighting of the auditorium is entirely taken care of by this method, yet suspended fixtures are used in some of the alcoves. The balconies and foyer are lighted by such fixtures. These serve the double purpose of illumination and decoration.

The footlights on the stage consist of 210 clear lamps and 70 each of amber, blue and red, with a 100-step dimming attachment. A complete portable system is provided by sixteen 300-watt stage pockets. The conference rooms and offices are lighted by small semi-indirect units made from staff.

Relief lighting for the cupola above the main dome is accomplished by installing 250 watt units on each story, placed one foot above the floor. The relief lighting for the pavilion towers has eight 250 watt units placed in the upper portion of each.

The total connected load exclusive of motors amounts to 106 kilowatts.

The average requirements of lighting in buildings closed at night, for janitor and patrol service, are figured on the basis of 1/10th watt per square foot of building area.

All exhibitors in the Machinery, Transportation, Manufactures and Mines and Metallurgy buildings, will light their own exhibits along lines which must meet with approval of the Department of Works.

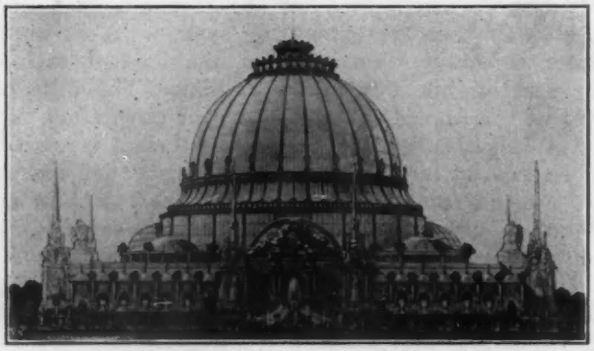
**Horticultural Hall** covers an area of more than five acres. The main building is 672 ft. long and 320 ft. wide in its largest dimensions. Towering above the front portion of the building an immense dome of glass and steel reaches to a height of 186 ft. and has a diameter of 154 ft. at the base. Four smaller domes and a number of lofty spires grouped about the main dome give a beautiful decorative touch to the architectural scheme.

Interior artificial illumination in the daytime is not an essential feature, owing to the large amount of glass used in the construction of the building, admitting the sunlight. Eight semi-domes flank the main dome. The interiors of these semi-domes are provided with electric lighting fixtures which supply the necessary light upon occasion and add to the architectural design. Ordinary electrical methods are employed for auxiliary lighting of the exhibits.

A tower of fifteen feet high, as a base and support for the special illuminating appliances, is erected

in the central interior of the main area. It is surrounded by tall cocoanut palm trees, concealing the electrical mechanism from view.

At the top of this tower is a glass lens plate set horizontally, five feet in diameter, ¼ in. thick and divided into quadrants. Each quadrant is a composite lens, made up of a number of small circular lenses cemented in the surface of the plate. The small lenses are each capable of projecting rays to all parts of the dome. Five different sets of composite lenses have been designed, each having a special lighting function. There are four of each set, making five complete lens plates.



A circular color screen is placed beneath the lens plate and in a parallel plane. It is slightly larger in diameter than the plate. The screen is made up of six equal-sized colored plates, there being three colors used and two plates of each color. The main scheme uses the colors yellow, blue and red, three primary colors, in that sequence and repeated, the two plates of each color appearing opposite each other.

Under the color screen is a circular sectored disc of the same diameter as the screen and consisting of four portions. Two of the portions are of opaque glass and double the size of the other two which are apertures, making the apertures of the same size as the plates in the color screen.

The color screen and the disc are mounted on a vertical rotating shaft, composed of two parts so that the screen is attached to one part and the disc to the other. The screen and disc rotate at varying rates of speed, so designed that the disc makes one more revolution per minute than the screen.

The rotating mechanism is operated by an electric motor, geared down to a ratio of twenty to one, that is, twenty revolutions of the motor will give one of the screen.

Twelve 30 in. electric projectors of 25,000,000 candlepower each, are arranged in a circle about the tower and set to throw their light upward through the color screen, the light first passing through the apertures in the disc. As the disc rotates through the flood of light cast by the projectors, the screen is also moving in the same direction, though at a slightly less rate of speed, and the light coming through the apertures filters through the color screen and up to the lens plate and is colored in the process.

It is easily understood that when the position of the aperture coincides with one of the color plates, a ray of that color will ensue, but as the disc in its slightly accelerated rate of speed begins to throw light into the next plate so that a color different from the other two will be formed and then fade into the color of the next plate. As the blue plate begins to encroach upon the field of the yellow, a greenish tinge in the rays will appear, expanding into a green light when both plates are equally over the aperture. As the screen rotates we find them, first the yellow rays, then the green formed by the blending of the yellow and the blue, then the blue, then purple as the blue and red mingle, then red, then orange as a combination of the red and yellow, then the cycle of colors is completed. Six colors have been thrown upward through the lens plate in the space of a minute, together with the various shades of intermediary light.

A combination of three lenses will also be used over the screen, and so arranged that only one at a time will be in position over this screen. One will be plain, one will produce spots of light, and the third will present an appearance of millions of tiny tadpoles squirming about the interior of the dome.

The Palace of Fine Arts lighting effects will be conducive to quiet and peace. This is the only permanent palace on the grounds, being constructed of reinforced concrete and steel.

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**An electrical farm** is attracting attention in the agricultural department of the Exhibition at Christiania. The energy for this model farm is supposed to come from a small waterfall in the neighborhood. The visitor is first of all struck by the splendid appearance of the fields, which turns out to be due to the employment of artificial fertilizer electrically manufactured. In the evening the house, the yard, stables and outhouses are radiant with electric light. In the kitchen there is an electrical oven, with four hot plates, a roasting oven, and a baking oven. When the food is cooked it is placed in an electrical heating apparatus. There are also electrical apparatus for cooking eggs and heating water. In the pantry there is a ½ h.p. motor, to which can be coupled nine different machines, such as a sausage mill, coffee mill, knife polisher, machine for cutting bread, ice machine, and a press to obtain juice from berries. The whole house is heated by means of electricity. In his bedroom the farmer has an electrical apparatus for heating water for shaving, and the housewife a neat electrical hair-curling apparatus. In the wash house is a 3 h.p. motor, driving a washing machine, and an electrical centrifugal drier, as well as an electrical mangle and an electrical iron. The workshop is equipped with an electrically driven lathe, saw, grindstone, glue heater and soldering iron. In the stables for cows and horses there is a motor of ⅛ h.p., to which apparatus for rubbing-down horses and shearing sheep can be coupled. There is also a milking apparatus, which is driven by a 1 h.p. motor. In the same building is a portable 10 h. p. motor, which supplies power for working the threshing machine and other agricultural machines. An electrical incubator is shown in another part of the exhibition. The whole exhibit shows excellently how the conditions of a farmer's life can be improved and how pleasantly and easily nearly all the work can now be carried out electrically.

# ELECTRIC DISTRIBUTION

## STANDARDS AT SAN DIEGO.

### E. Transformers.

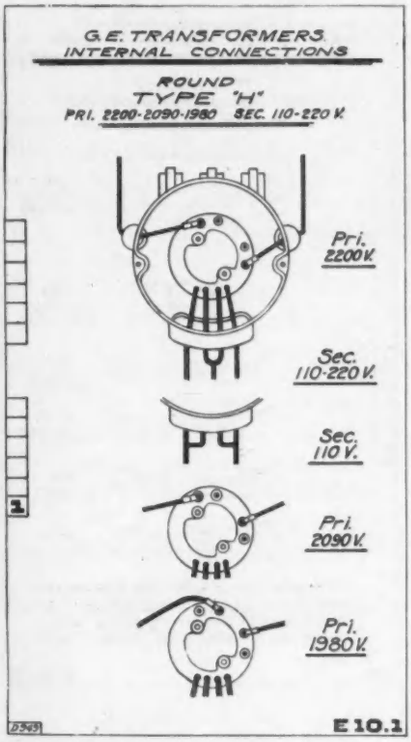
BY L. M. KLAUBER.

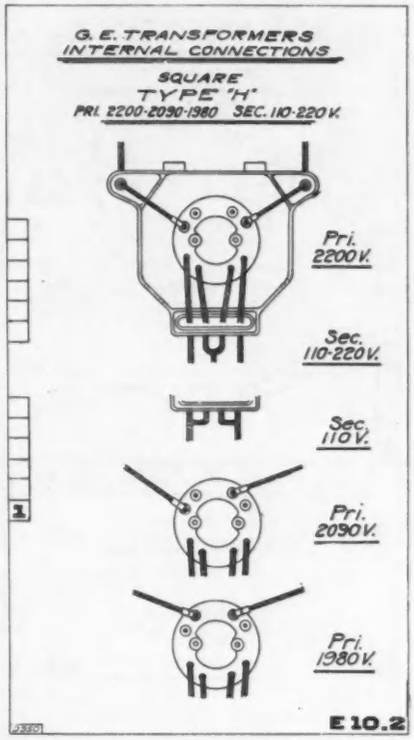
[Continued.]

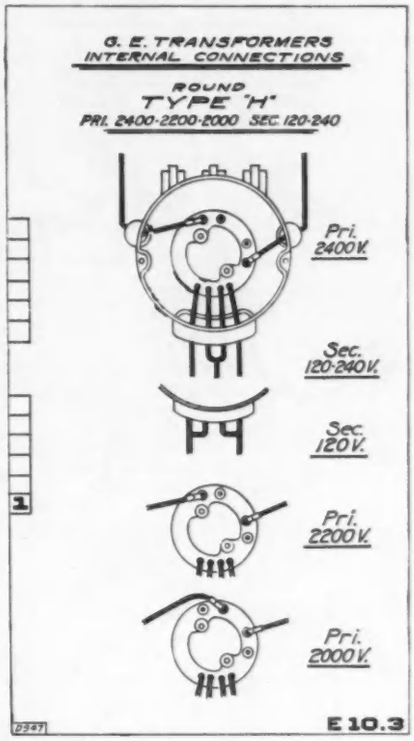
This section contains information along the following lines:

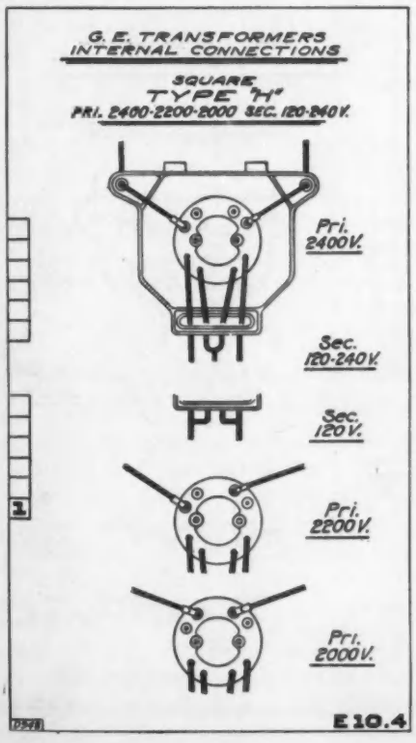
E 10 Internal Connections. E 50 Weights.
E 20 Grounding. E 60 Case and Oil Data.
E 30 Fuses for Transformers. E 70 Wiring Diagrams.
E 40 Sketches for Hanging.

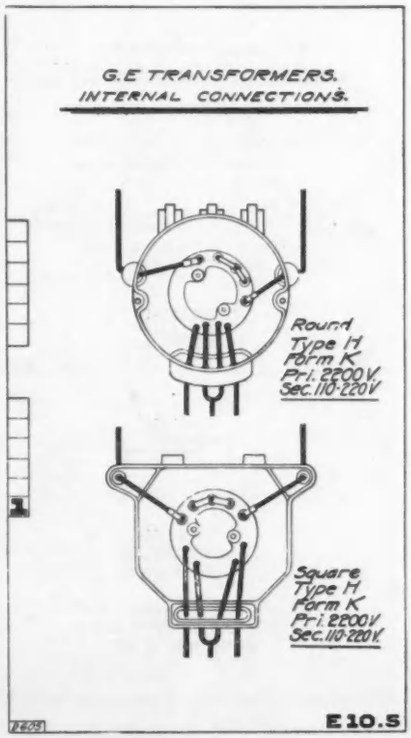
**E 10: Internal Connections.** Connection diagrams are inserted in the handbook for each type and form of transformer on the company's lines. These diagrams are elementary and to a certain extent are duplicated for the several types; however it has been found advisable to show the exact appearance of the

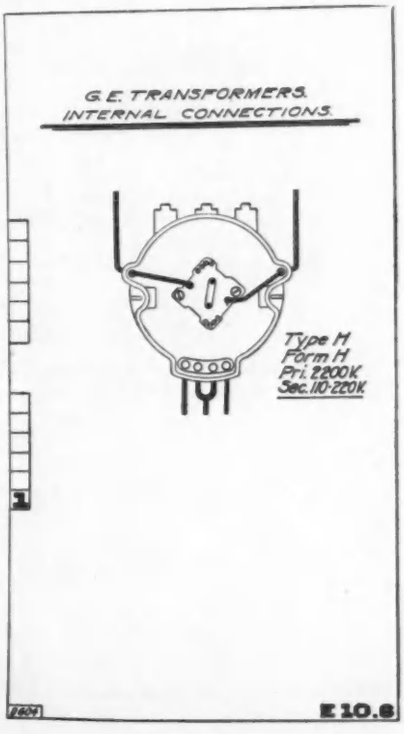




G.E. TRANSFORMERS.
INTERNAL CONNECTIONS.
Round Type H Form K Pri. 2200 V. Sec. 110-220 V.
Square Type H Form K Pri. 2200 V. Sec. 110-220 V.
E 10.5



transformer terminal blocks for each form of transformer, as linemen are sometimes confused by diagramatic sketches. This is the reason for such repetitions as E 11.1 and E 15.1.

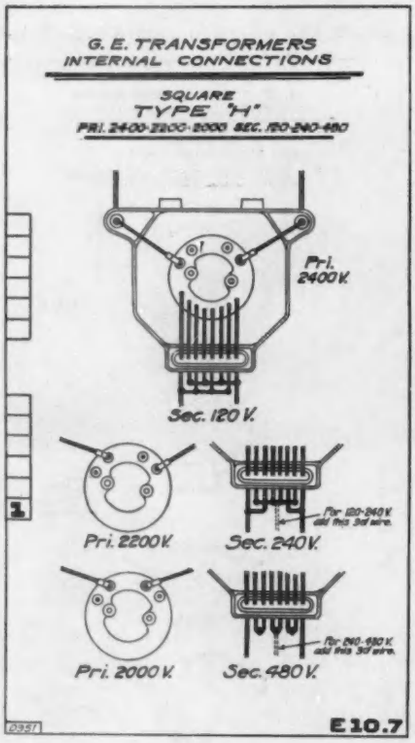
It will be noted that there is an unnecessary variation in taps and secondary voltage arrangements; this is due to the fact that transformers were formerly purchased without adherence to standards. Present standard ratings are as follows:

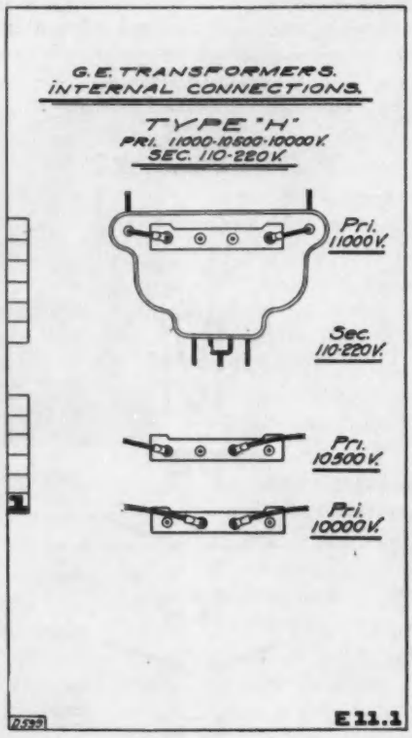
For 2300 Volt Service:
40 k.v.a. or less—2400-2280-2160/240-120.
50 k.v.a. or more—2400-2280-2160/480-240-120.

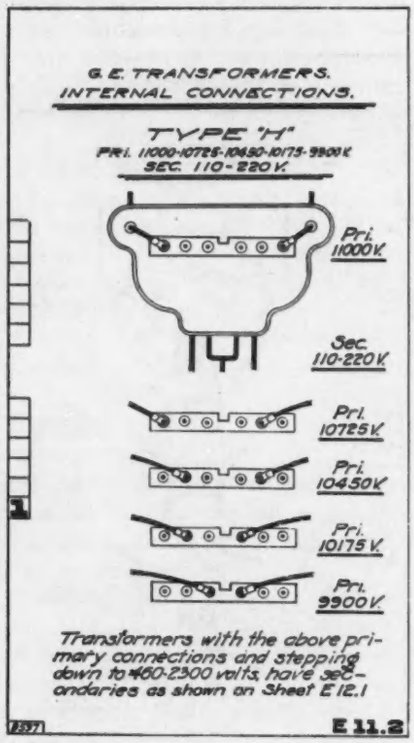
For 11,000 Volt Service—low voltage secondaries:
30 k.v.a. or less—11,000-10,500-10,000/230-115.

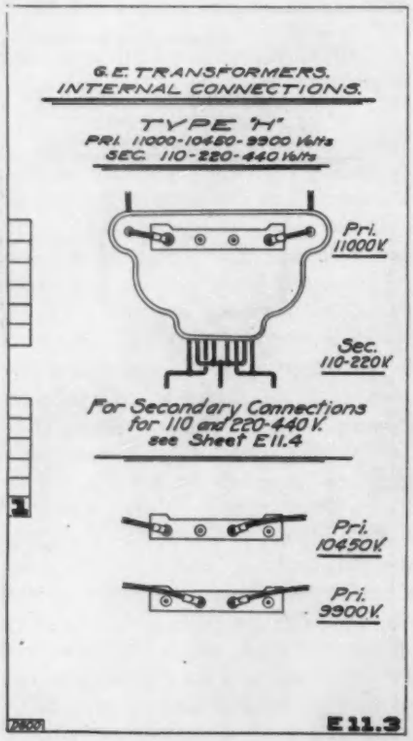
For 11,000 Volt Service—medium voltage secondaries:
10 k.v.a. or more—11,000-10,500-10,000/2300-460.

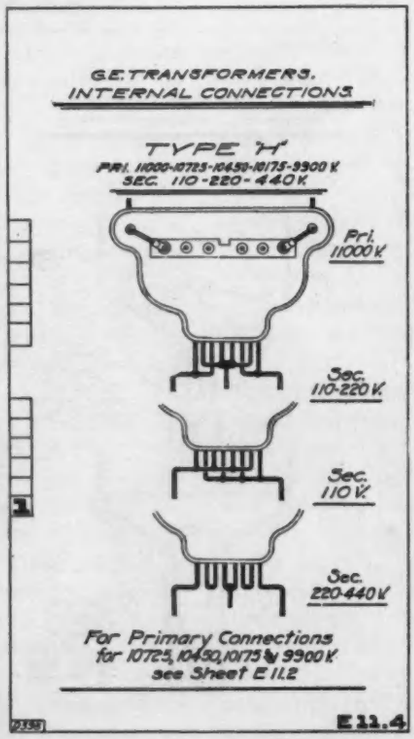
Occasionaly 11,000 volt transformers are purchased with 4-2½ per cent reduced capacity taps instead of 2-5 per cent taps as noted above.

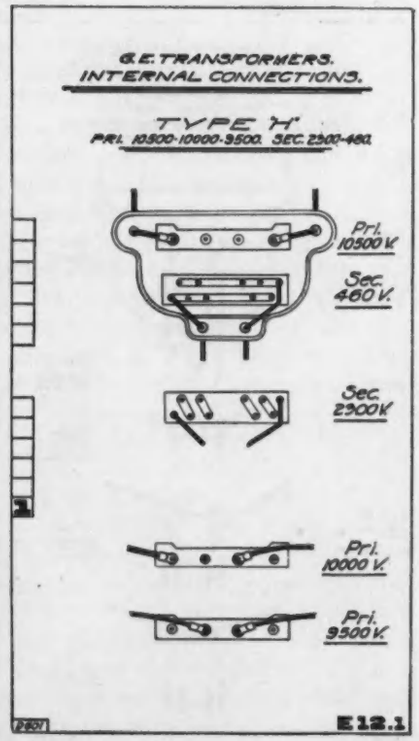


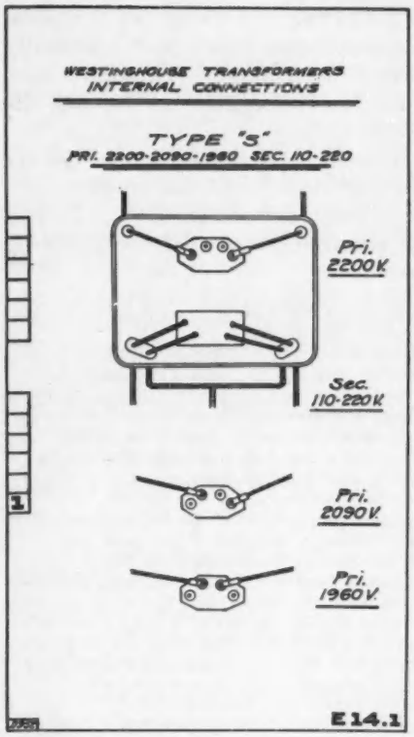



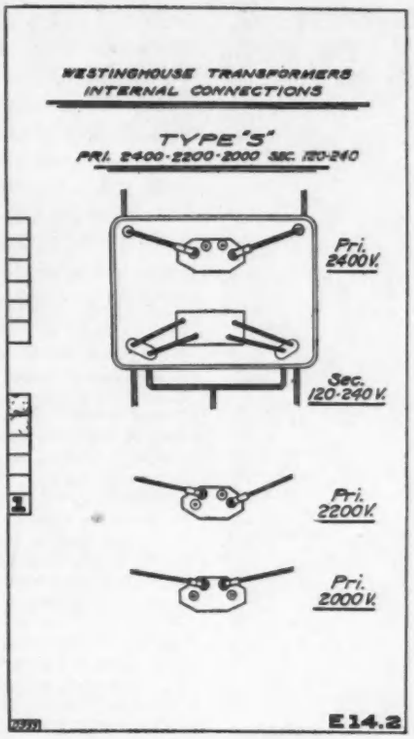


G. E. TRANSFORMERS.
INTERNAL CONNECTIONS.
TYPE "H"
PRI. 11000-10725-10450-10175-9900 V.
SEC. 110-220 V.
Pri. 11000 V.
Sec. 110-220 V.
Pri. 10725 V.
Pri. 10450 V.
Pri. 10175 V.
Pri. 9900 V.
Transformers with the above primary connections and stepping down to 460-2300 volts, have secondaries as shown on Sheet E 12.1
E 11.2

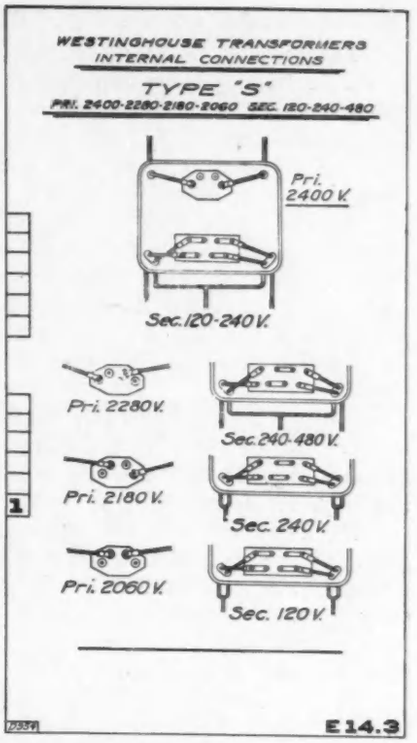


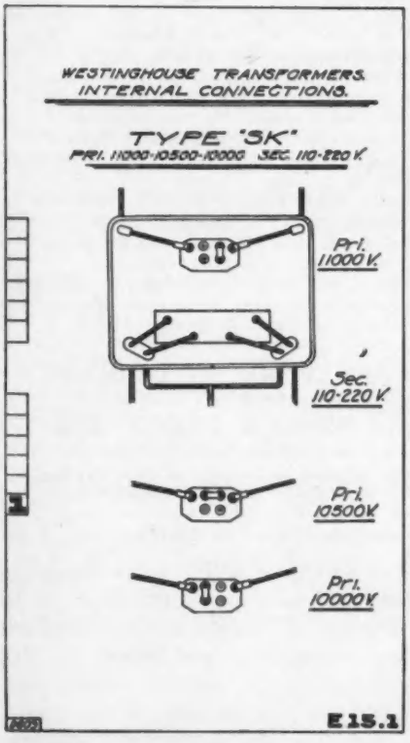



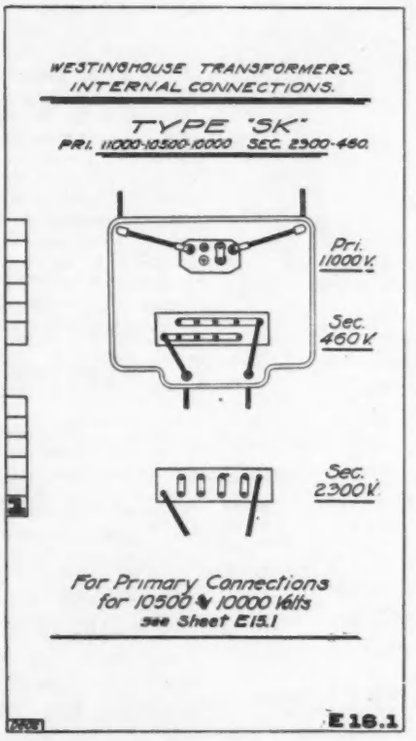



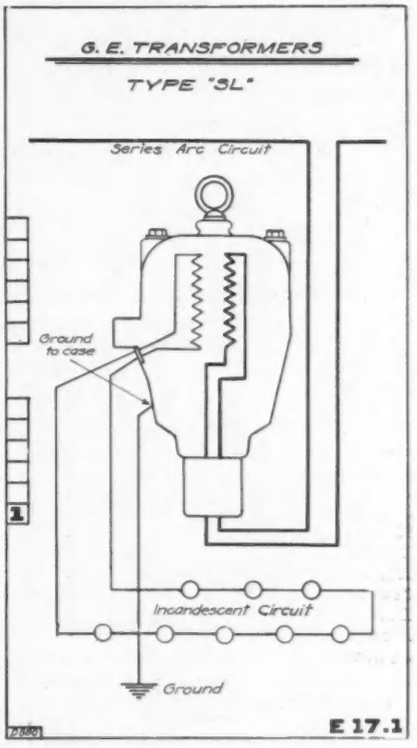



The office record of transformer stations contains, besides the usual information as to the transformers installed and load connected, data on the tap in use to facilitate the proper interpretation of voltage charts. By this means when corrective measures are required definite information concerning the change of taps to be made can be given the trouble man with a reference to the proper connection diagram in the book.

[To be continued.]

**The tungsten resources** of the United States are probably considerably larger than have been generally realized. Many new deposits have been discovered in various parts of the Western States, according to the United States Geological Survey, and, should prices advance, it is probable that the output could soon be increased, much above the record year of 1910, when 1821 tons were marketed. Most of these new discoveries are not sufficiently developed to show how large an output can be expected from them; but it is probable that some will prove to be of considerable extent, and one or two new large producers would make a noticeable difference in the American market. Similar discoveries may also be expected in other parts of the world.

## ELECTRICAL SUPPLY JOBBERS' MEETING.

The regular quarterly gathering of the Pacific Coast electrical jobbers and their friends, the electrical manufacturers' representatives, was held at Del Monte, Cal., September 24, 25, 26. As usual the main subjects of contention were golf and pool, the results being shown in detail herewith.

At the open meeting on Saturday Mr. T. E. Burger read a paper advocating more creative sales work by jobbers. This paper is printed in full in this issue. An extended discussion was held by those present and this subject will probably also form the subject of a paper on the other side at the next meeting.

Judge T. M. Debevoise, counsel for the association, explained that the association is purely an educational organization and has nothing to do with fixing of prices or restraint of trade.

He described a recent innovation in the service given to the members whereby the products of any manufacturer can be listed in a general catalogue a copy of which is furnished to each jobber. The manufacturer has only to bear the cost of printing and distributing the sheets describing his product.

Further service consists in educating the members on sane methods of merchandising and more economical handling and distribution of supplies.

It was emphasized that no inquiries are made as to how the manufacturer markets his product nor does the association restrict the members in their dealings with manufacturers.

The association invites inspection of its affairs by governmental authorities and is following a policy of free, frank and open publicity of its doings.

At the golf dinner on Saturday evening, H. V. Carter, as toastmaster, presented the various winners with their trophies, each responding with a few words.

**MANUFACTURERS.**
**Del Monte and Jobbers' Cup.**

| | Gross. | Handicap. | Net. |
|---|---|---|---|
| Bibbins | 98 | 0— | 98 |
| Davis | 95 | +8 | 103 |
| Clapp | 97 | +10 | 107 |
| Hall | 103 | —13 | 90 |
| Hyde | 111 | —12 | —99 |
| Lillard | 84 | +10 | 94 |
| Pounder | 130 | —18 | 112 |
| Murray | 96 | —10 | 86 |
| Young | 87 | +2 | 89 |
| Hansen | 94 | +5 | 99 |
| **Seaver** | **97** | **—18** | **79** |
| Dunbar | 111 | —15 | 96 |
| Poss | 104 | —12 | 92 |
| Squires | 109 | —18 | 91 |

**JOBBERS'.**

| | Jobbers' Copper Cup and Del Monte Trophy. | | | Pass & Seymour, Contractors'. | | |
|---|---|---|---|---|---|---|
| | Gross. | Handicap. | Net. | Gross. | Handicap. | Net. |
| Berry | 101 | 0 | 101 | 99 | 0 | 99 |
| Burger | 106 | 0 | 106 | 105 | 0 | 105 |
| Carter | 100 | +5 | 105 | 91 | +5 | 96 |
| **Colwell** | 98 | 0 | 98 | **100** | **—18** | **82** |
| Debevoise | 101 | +5 | 106 | 100 | +5 | 105 |
| **Goodwin** | **91** | **+5** | **96** | 94 | +5 | 99 |
| Hillis | 89 | +9 | 98 | 83 | +9 | 92 |
| Hall | 111 | —12 | 99 | ... | ... | ... |
| Leggett | 98 | +5 | 103 | 98 | +5 | 103 |
| Taylor | 131 | —24 | 107 | 135 | —30 | 111 |
| Overbagh | 99 | —0 | 99 | 99 | —0— | 99 |

In the jobbers' tournaments W. L. Goodwin was announced as the third time winner of the jobbers' copper cup which can never become the permanent possession of any winner. He also received the Del Monte trophy. J. I. Colwell was the first winner of the beautiful new Pass & Seymour cup which will eventually be awarded to a three time winner. The contractors' cup was awarded to F. H. Leggett, as having the fourth best gross score.

In the manufacturers' tournament W. H. Seaver won the jobbers' cup and the Del Monte trophy.

The pool tournament was won by O. W. Lillard with C. C. Hillis as runner-up, handsome cups being awarded in each case.

Those present at the meeting were as follows:

Phil. Aaron, Fobes Supply Co., Seattle.
W. Shelby Berry, Western Electric Co., San Francisco.
T. Elwood Bibbins, General Electric Co., San Francisco.
T. Ernest Burger and wife, Western Electric Co., Los Angeles.
Harry Byrne, North Coast Electric Co., Seattle.
H. Von Carter, Pacific States Electric Co., San Francisco.
Ralph B. Clapp, Manufacturers' Agents, Los Angeles.
J. Irving Colwell, Western Electric Co., Seattle.
H. Harmony Cudmore, Mazda Bureau, San Francisco.
E. Metallus Cutting and wife, Edison Storage Battery Co., S. F.
R. James Davis, Century Electric Co., San Francisco.
T. McElrath Debevoise, Jobbers' Association, New York.
W. Robert Dunbar, Westinghouse Elec. & Mfg. Co., San Francisco.
A. Howell Elliott, Secretary, San Francisco.
W. Lincoln Goodwin, Pacific States Electric Co., San Francisco.
Newton W. Graham, Holabird-Reynolds Elec. Co., Los Angeles.
Silas Gregory and wife, Arrow Electric Co., San Francisco.
W. Brewster Hall, Pass & Seymour Co., San Francisco.
Clarence B. Hall, Illinois Electric Co., Los Angeles.
A. Hobart Halloran, Journal of Electricity, Power and Gas.
B. Alvin Hansen, A. G. Electric Co., San Francisco.
C. Clement Hillis and wife, Electric Appliance Co., San Francisco.
Park B. Hyde, Thomas A. Edison Inc., San Francisco.
C. De Witt La Moree, Westinghouse Elec. & Mfg. Co., L. A.
F. Hamilton Leggett, Western Electric Co., San Francisco.
Ogden W. Lillard and wife, Gould Storage Battery Co., S. F.
Frederick W. Murray, National Carbon Co., Los Angeles.
Franklin Overbagh, Overbagh & Ayres Mfg. Co., Chicago.
F. Henry Poss and wife, Benjamin Electric Co., San Francisco.
Wilbur Pounder, Hubbard & Co., San Francisco.
Frank J. Quinn, Manhattan Elec. Supply Co., San Francisco.
Harold Sanderson, Bryant Electric Co., San Francisco.
W. Hibbard Seaver, U. S. Steel Products Co., San Francisco.
Herbert B. Squires, H. B. Squires Co., San Francisco.
S. Henry Taylor and wife, Elec. Ry. & Mfrs. Supply Co., S. F.
Ashley G. Young, Telephone & Electric Equipment Co., S. F.
C. Edward Wiggin, Dunham, Carrigan & Hayden Co., S. F.

## CREATIVE SALES WORK BY JOBBERS.

BY T. E. BURGER.

*(This paper advocates that the electrical supply jobber do more creative sales work and concentrate his lines. It was presented at the Del Monte meeting of jobbers and manufacturers on September 27. the author is the manager of the Western Electric Company at Los Angeles.—The Editor.)*

If a manufacturer adopts a policy of recognizing the jobbers' important and salutary field of action to the extent of distributing his entire output through him, does the jobber's obligation end when he has his shelves well stocked with that manufacturer's product and fills orders for same on demand of his trade? Or is it to be expected that the jobber will demonstrate his approval of the manufactuer's confidence and co-operation by endeavoring to create a call and a market for his goods?

Generally speaking a jobber should do his utmost to create business on lines of goods having genuine merit and which can be marketed at fair profits.

A jobber who will specialize in sales effort on one meritorious line, particularly if there are numerous other competing lines, will be a far more successful distributer than one who is willing to accept orders for any make of article called for by the whims of his customers. The truth of this statement is self evident

and is epitomized in the one word CONCENTRATION.

By this is not necessarily meant that we should refuse to accept orders for any other make than that which we are exploiting, as this is a question of individual or company policy.

The jobber derives manifold advantages from creative sales work and by identifying himself with a particular line of goods. The most important of these advantages are:

Salesmen doing creative, or missionary work must, of necessity, know their goods thoroughly and are therefore able to impress their customers with a sense of this knowledge, thus associating the article with the salesman and the company he represents.

Such a salesman is aiding a manufacturer whose policy is a distinct help to the jobber, and a correlation of interest exists between all parties, which is very essential to successful merchandising.

Creative sales work on the jobbers part offers an object lesson to manufacturers whose policy is to ignore the jobber and go direct to the trade—a tendency which, in some localities, is becoming more manifest each day.

If the jobbers' customers have confidence in the jobber, they are also going to rely on the goods which that jobber stands behind and is exploiting in every possible way. Maximum effectiveness cannot exist if we try to increase our business on several lines that are practically identical.

Creative sales work develops the best there is in the salesman and gives him something worth while to talk about, leaving an impression in the customer's mind that the salesman is not merely calling to collect an order for anything that's needed. A salesman who does no creative sales work is little better than the average grocery solicitor who calls every morning to take orders for whatever the housewife finds is required to replenish her larder. Such a salesman is bound to became less and less effective, and therefore less valuable to his company as a business producer.

Let us take a hypothetical case: Smith has just been awarded the electrical contract for the Travelers' Hotel. Green, representing the Usual Electric Company, jobbers of electrical supplies, calls to get some business from Smith and says, "Mr. Smith, I was glad to hear of your securing the contract for the Travelers' Hotel and rushed right over to congratulate you and make sure that you wouldn't forget us on the material."

Smith says "Why, yes, I'll give your company some of the business. How would you like to furnish the wire and switches?"

"Fine! How much and how many are you going to need?"

"Well, I haven't figured out the exact quantities as the architects have made a few changes in the plans. By the way, what make of switch do you handle?

"Oh! we carry Excelsior, Ne Plus Ultra and High Flier in stock, but if you'd rather have Bingo or Sickem we can get them for you."

"All right, come around about the end of the week and we'll see what we can do."

Exit Green and his price book after making a pass of one cigar.

Scene II. Same place, half hour later. Enter Wise of the Efficient Electric Company.

"Good morning Mr. Smith; glad to hear you have the Travelers' Hotel job. Came over to give you a valuable tip. Here's a chance to save yourself a clean sixty dollars."

"How?"

"Well, you know our company is pushing Bingo switches and we want you to use them on this job. The price of the switch is the same as any inferior make, but the quality is far superior. Just take a look at this sample. See that little hickey over against that screw. Well, all you have to do is push the wire against the hickey and the wire curls right under the screw head. Other manufacturers have tried to copy that but they can't seem to get it as perfect as the Bingo people. One of our customers who uses nothing but Bingo switches says that one thing saves him five minutes' time per switch on finishing. Now five minutes of a wireman's time is worth about 4 cents to you, and as I understand there are some 1500 switches to go into the Travelers' Hotel you save $60. And that's only one of the many good features possessed by the Bingo switch. Our company doesn't try to sell any other for we have found this to be the best. The Bingo is made by a first class manufacturer who stands behind it and so do we."

Whether Green or Wise obtains the order is not germane. Which of the two salesmen has impressed his personality and the individuality of his company on the mind of the customer? The one who was doing creative sales work or the one who would be satisfied with an order for anything?

After this when Smith thinks of the Efficient Electric Company he is quite apt to think of Bingo switches, and if he thinks of Bingo switches he is surely going to think of the Efficient Electric Company.

For the purpose of this illustration even if the Bingo switch had no particular merit all its own, the fact remains that Wise has accomplished a sales job and he can, if he finally procures the order, feel far more self satisfied than Green could if he secured it on a purely "personality-plus" basis, without a thing to talk about but giving the customer anything he wanted.

Another thing. Which means more to the trade, the jobber or the factory missionary? One of these systems of selling has left all the creative work to the factory representative, thus enhancing his importance in the eyes of the trade, while the other system has done the creative work itself, thereby enlarging the customer's conception of the jobber.

In doing introductory work it should be borne in mind by the manufacturer that the jobber faces a difficult situation and is doing work which would otherwise be costly to the manufacturer, since good real salesmen are scarce and high priced. Having this in mind the profit allowed should be commensurate with the effort expended and such as to encourage the jobber in exerting his best efforts.

The ultimate result obtained from a universal plan of creative sales work by jobbers, would be the elimination of the factory missionary, who is only too frequently a missionary of meanness, introducing, not only his legitimate wares, but illegitimate methods of

doing business. How many times are gifts, premiums, and various intangible values given to purchasers? And how often does the jobber bear the brunt of the customer's grouches when the latter finds that there is "nothing doing" when he orders again from the jobber? This does not mean that the factory representative is an unnecessary factor in other fields than merely missionary work.

Unquestionably a jobber cannot do effectual constructive work on two or more parallel lines, therefore we might enlarge on the benefits to be derived from decreased investment, reduction of stock-keeping costs, elimination of much clerical routine, abridgement of catalog, etc., but the main point is already covered, viz:

Creative sales work is a proclamation of the jobber's individuality. No creative sales work makes him a nonentity, or a commission man with a warehouse.

If we want to be something, if we want to stand for something in the eyes of our trade, if we want to augment the importance of our position in the great electrical industry, and most of all if we want to increase our profits, let us ourselves (not others) create a demand for the goods we have to sell.

## LETTERS TO THE EDITOR.

### Report on Inductive Interference.

To the Editor:—The report of the Joint Committee on Inductive Interference and the Railroad Commission's General Order No. 39 are the subject of an editorial in the issue of the Journal for September 19th, under the dual heading: "The Balance of Power."

Your diagnosis of the situation deserves hearty commendation. It is stated that "an unbiased observer cannot but think that the power companies were the original innocent aggressors," and let us add without malice aforethought that there are some which are not quite so innocent. General Order No. 39 is not primarily intended for the innocent aggressor.

Practically all transmission companies operate telephone lines paralleling and generally, on the same poles with their high voltage lines, and if we are not familiar with the conditions governing good telephone service, from the experience gained thereby, General Order No. 39 may prove a revelation to us. There are some telephone lines operating on pole lines carrying 60,000 volts or more, and extending over long distances and which, under normal conditions, are entirely free from inductive disturbances. Again, there are some exchange lines operating in the vicinity of one leg of a 5000 volt a.c. lighting circuit, which are so noisy as to be absolutely useless for communication purposes. There is, between these extremes, an extensive series of conditions which, we assume, the Joint Committee has classified, and has endeavored to eliminate the freaks and near freaks of what constitutes established practice in power transmission.

The first common battery telephone exchange on the Pacific Coast was installed in 1903 under the writer's supervision. This was used for despatching and exchange purposes of the Pacific Electric Railway system. Being also responsible for the operation of the high tension, trolley and feeder lines of the same system, it was not difficult to establish the relationship between good and bad telephone service. Investigations and tests by all the telephone experts available, together with the co-operation of the power department, led to the early abandonment of common battery for despatching purposes. It became necessary to cut these lines off, as far as practicable, from exchange lines, and the despatching lines were thereafter operated as independent units on the magneto system; and the same methods adopted at that time are still in use today.

Lines terminating on a common battery switchboard, or any other board of standard type, communicate and augment accumulated inductive disturbances. What chance, therefore, has a telephone company, operating many thousands of exchange and other lines, of giving even fair service when the switch board represents the easiest point of discharge for the charges and leakage currents of many miles of high tension parallels?

This is the question which has been fairly and honestly put to the Joint Committee on Inductive Interference, and it should be noted that the power companies' component on this committee had not offered a serious protest as yet, nor has it rendered any minority report on the investigations of the committee, nor is it to be anticipated, as it is well known that these companies contributed funds for carrying on this investigation to obtain the answer to a very vexing problem, regardless of who would consider themselves injured thereby.

We hear a great deal in this decade about commercial co-operation and engineering ethics. The nondescript type of co-operation, which consists of aggressive condemnation of regulations intended for the public benefit, reflects adversely upon our common sense, and, in making this statement, reference is not made particularly to the opponents of General Order No. 39.

Co-operation consists largely of giving a fair deal and demanding the same in return, and seeing that we get it. As an instrument of enforcing the fair deal upon the power and communication companies, General Order No. 39, and the report of the committee which accompanies it, will go down in history of line construction and operation as a classic. It hits the power companies hard in spots and, from an operating standpoint, it is regretable that it may be necessary to adopt an extensive transposition scheme for the high voltage lines, but the innocent aggressor need not suffer in the least. The power companies operating in Southern California have little to fear from the effects of the order. It will be necessary to adapt operating conditions to eliminate some features condemned by the committee, and even this need not be done except when it is fully determined as the direct cause of trouble on communication circuits. Our companies have already gone far in eliminating the troubles referred to.

An agreement existing between the power and communication companies includes the following article in its specification:

**In general, light, power and railway circuits of over 5000 volts, alternating current, shall not be placed on poles erected on the same side of the street, highway, public or private place, occupied by telegraph, telephone, or signal circuits, nor on the same street, highway, public or private place, where long distance lines of the telegraph, telephone**

**or signal companies are maintained, if same can be avoided at reasonable expense, nor shall telegraph, telephone, or signal circuits be placed on poles erected on the same side of the street, highway, public or private place, occupied by light, power or railway circuits of over 5000 volts, alternating current, nor shall long distance lines of the telegraph, telephone or signal companies be placed on the same street, highway, public or private place, which has previously been occupied by light, power or railway circuits of over 5000 volts, alternating current, if same can be avoided at reasonable expense. It is understood that telegraph, telephone and signal circuits, used only for operating light, power and railway circuits of over 5000 volts, and not available for the use of the public, are exempt from this provision. Exception to the preceding provisions may be had upon regular application in writing and under suitable specification prepared by the committee for each case.**

It took several years to bring this up to its present form, each advancement being of constant endeavor for improvement in service and safety on a cooperative basis, and the Joint Committee on Inductive Interference, backed by the authority of the railroad commission, has carried us forward several years at a single stride. This is the very essence of regulation, where apparently opposing forces, not understanding each other's problems and necessities, fully adapt themselves almost automatically to the mandates of authoritative and competent jurisdiction.

It should be particularly noted that where it becomes necessary to make any changes upon existing systems, in order to comply with the retro-active features of the order, the burden of expense should be borne by the beneficiaries. In the present situation, it is hoped that the committee will not be disbanded, and if it is found that mistakes have been made, their rectification will be an easy matter, and if it is found that the rules are not stringent enough, let us cooperate with the committee as engineers and accept the result accordingly.

Respectfully,

J. E. MacDONALD,

Secretary Joint Pole Committee.

Los Angeles, Sept. 26, 1914.

## THE UTAH LIGHT & RAILWAY COMPANY SOLD.

Salt Lake City, Utah.—Local and eastern capital associated with the Utah Power & Light Company of this city and the Electric Bond & Share Company of New York have purchased from the Harriman system a controlling interest in the Utah Light & Railway Company and have organized the Utah Light & Traction Company to take over this property, the Utah Light & Railway Company passing out of existence by the transaction.

The Utah Light & Traction Company is incorporated for $10,000,000 and its officers and directors include some of the most prominent business men in Salt Lake.

O. J. Salisbury of Salt Lake is president of the new company, C. W. Johnson and R. C. Gemmell of Salt Lake are vice-presidents, together with C. E. Groesbeck of New York.

The treasurer is S. A. Whitney of this city, and the assistant treasurers are E. O. Howard of Salt Lake City and Eugene P. Summerson of New York. A. H. Parsons of this city is secretary of the company. The assistant secretaries are J. M. Bidwell of Salt Lake and Lawrence W. Osborne of New York.

The directors of the new corporation are as follows: O. J. Salisbury, S. A. Whitney, A. H. Parsons, C. W. Johnson, R. C. Gemmell, J. M. Bidwell, E. O. Howard, J. Frank Judge, and Joseph S. Wells, the general manager of the Utah Light & Railway Company and who has been a director in that concern.

The financial interests controlling the Utah Power & Light Company—the General Electric Company—have interested themselves, together with local capital in the newly organized Utah Light & Traction Company. But the Utah Power & Light Company itself has at this time no direct connection with the new corporation.

However, it is said that within a short time the lighting, street railway and power interests of the Utah Light & Traction Company will be divided, The railway end of the business, it is said, will remain with the present company, and the lighting and power business will be taken over by the Utah Power & Light Company. At the same time the latter corporation will contract with the former to furnish all current for lighting and for the operation of the street car system.

This deal was finally consummated on September 18th when the stockholders of the Utah Light & Railway Company met and voted to ratify the sale agreement which had been negotiated by the management. Holders of the preferred stock of the former company may exchange their shares at par for the stock of the new company or they may receive cash at par for them. Holders of the common stock of the former company may exchange them for stock of the new company or may receive cash for them on the basis of 47 per cent of their par value.

The officers of the new company immediately issued a statement that they contemplate at the present time no radical changes in management or policy. Joseph S. Wells, general manager of the Utah Light & Railway Company has been appointed to the same position in the United Light & Traction Company and all of the department heads in the former company have been reappointed to their same positions with the new company.

Just eight years ago this month Mr. E. H. Harriman who had unlimited faith in the future of Salt Lake City purchased controlling interest in the Utah Light & Railway Company. The property had been held for several years by interests who were unable themselves to provide sufficient money to meet its rapidly growing needs or to maintain it on a substantial operating basis. The cars, road bed, transmission and distribution system and practically the entire physical property were in a run down and dilapidated condition. In line with Mr. Harriman's well known policy of first putting a company in first class operating condition and being willing to wait for returns, work was immediately started on the reconstruction of the system and during the succeeding five years it was practically completely rebuilt so that the property acquired by the new owners is a new, thoroughly modern and efficient one.

In the fall of 1912 the Electric Bond & Share Company began to acquire electric properties in Utah

and southern Idaho believing that this region offered a splendid field for the development of profitable electric service of all kinds. They organized the Utah Power & Light Company with a capital of $40,000,000 which was later increased to $45,000,000 and preparations were made immediately to consolidate the majority of small electric generating and distributing companies then in the field and to inaugurate extensive new development work. Between $6,000,000 and $7,000,000 was set aside for the construction of new power houses and transmission systems planned by the company, while a very large sum was immediately invested in the purchase of establishing power plants and distributing lines.

The first class of properties united by the Utah Power & Light Company consists of complete systems generating, transmitting, reducing and distributing hydroelectric power. The second class consists of substations and distributing systems and to the third class belong the power plants taken over from companies that had built them for private use or as a limited side issue of their own works.

In the first group—complete systems generating, transmitting, reducing and distributing power—the Utah Power & Light Company consolidated the following concerns:

The Telluride Power Company (Utah-Idaho department), Provo, Utah; The Knight Consolidated Power Company, Provo, Utah; The Idaho Power & Transportation Company, Idaho Falls, Idaho; The Bear Lake Power Company, Montpelier, Idaho; The High Creek Power & Light Company, Richmond, Utah; the Davis County Light & Power Company, Farmington, Utah; and the Park City Light & Power Company, Park City, Utah.

The second class of companies consolidated by the Utah Power & Light Company consisted principally of concerns engaged in retailing electricity and the following companies were taken in under this classification: Idaho-Utah Electric Company, Preston, Idaho; The Merchants Light & Power Company, Ogden, Utah; The Home Telephone & Electric Company, Farmington, Utah; The Institute Electric Company, Bingham, Utah; The Electric Company, Provo, Utah; The Eureka Electric Company, Eureka, Utah; and the Camp Floyd Electric Company, Mercur, Utah.

The third group of properties taken over by the Utah Power & Light Company included principally power plants of private and public service corporations, the purchases consisting of the following: The power plant of the Utah Copper Company, at Garfield, and the plant of the Blacksmith Fork Light & Power Company, Ogden, Utah, (both of which are leased); and the power plant of the Salt Lake & Ogden Railway Company, Farmington, Utah; the plant of the Davis and Weber Counties Canal Company, Riverdale, Utah; and the power plant and transmission system of the Utah-Idaho Sugar Company, Collinston, Utah.

Serving a territory extending, as stated above, from Ashton, Idaho, 300 miles south through Idaho and Utah to Eureka, Utah, the total hydroelectric generating capacity of these 19 companies consolidated by the Utah Power & Light Company is 51,345 kilowatts, while the steam generating capacity is 9400 kilowatts.

This makes a total capacity of 60,745 kilowatts generated by the various power plants as follows:

The power plant at Idaho Falls on Snake River, 1875 kilowatts; the plant at St. Anthony on Snake River, 75 kilowatts; the plant at Teton on the Teton River 100 kilowatts; the power house near Georgetown on the Georgetown Creek, 180 kilowatts; the Paris plant on Paris Creek, 650 kilowatts; the Grace power house on Bear River, 11,000 kilowatts; the Preston plant on Cub River, 550 kilowatts. These power plants are all in Idaho.

The Utah plants and the kilowatts generated by each are as follows:

Near Hyrum on Blacksmith Fork, 2500 kilowatts; near Collinston on Bear River, 7125 kilowatts; near Logan, on Logan River, 2000 kilowatts; near Brigham City, on Willard Creek, 300 kilowatts; near Ogden on Weber River, 3750 kilowatts; near Farmington, on Farmington Creek, 312 kilowatts; two near Murray, on Mill Creek, together 1700 kilowatts; at Alpine, on Alpine Creek, 1750 kilowatts; two near American Fork, on American Fork River, together 2150 kilowatts; near Pleasant Grove on Battle Creek, 2400 kilowatts; at Olmstead on Provo River, 7200 kilowatts; near Santaquin, on Santaquin River, 880 kilowatts; near Heber, on the Provo River, 2500 kilowatts; near Midway, on Snake River, 1180 kilowatts; near Park City on Ontario drainage tunnel, 169 kilowatts.

All of the above plants are hydroelectric power houses, the water power being furnished by the rivers and creeks on which they are located.

In addition to these, the steam plant at Farmington, Utah, generates 800 kilowatts; the steam plant at Garfield, Utah, 8500 kilowatts; and the steam plant at St. Anthony, Idaho, 100 kilowatts.

Over 1398 miles of three-phase transmission line carries the power generated by these Idaho and Utah power houses.

The officers of the Utah Power & Light Company are as follows:

D. C. Jackling of Salt Lake, one of the foremost mining operators in the world and the executive head of the Utah Copper Company, is president of the company. W. S. McCornick of Salt Lake, head of the banking house of McCornick & Company recognized as one of the leading financiers of the west, is senior vice-president. P. B. Sawyer of Salt Lake is vice-president and general manager, and G. B. Thomas of Salt Lake is secretary and assistant treasurer. S. Z. Mitchell of New York City is chairman of the board of directors; G. M. Dahl of New York is vice-president; G. E. Claflin of New York is vice-president and E. P. Summerson of New York is treasurer.

The Utah directors of the company include M. H. Walker, president of Walker Brothers, bankers of Salt Lake; T. R. Cutler, general manager of the Utah-Idaho Sugar Company, Salt Lake; P. J. Moran, Salt Lake, contractor; C. W. Nibley of Salt Lake and C. E. Loose of Provo, Utah, together with Mr. Jackling, Mr. Cornick and Mr. Sawyer, all of Salt Lake. The other directors of the company are James Campbell of St. Louis, Missouri; Charles Hayden of New York; J. R. Nutt, Cleveland, Ohio; Mr. Mitchell of New York; John M. Hayes, and R. W. Breed, both of New York, and Bulkley Wells of Telluride, Colorado.

## NORTHWEST ELECTRIC LIGHT AND POWER ASSOCIATION CONVENTION.

The proceedings of the first day's meeting of the Northwest Electric Light & Power Association convention at Spokane, September 9, 10, 11 and 12, appeared in these columns September 19.

The association re-convened at 10:30 a. m. September 10 with M. C. Osborn in the chair. L. A. McArthur, assistant general manager, read his paper on

**"Organization and Operation of Branch Offices and Plants."**

**This paper is not so much of a treatise as a record of the actual experiences of the Pacific Power & Light Company in handling its branch offices and takes up in detail the different methods and systems which that company has developed as the most efficient methods of handling an organization of this character—taking up the actual arrangement of the organization; the manner in which supplies are ordered and received; the authority of the local manager in dealing with the public.**

The first part of the discussion was largely concerned with addressograph practice, E. H. West asking questions and L. A. McArthur answering them. The bills of most of the branch offices of the company are addressed at one office and shipped by mail or express. The machine is also used in getting out part of the pay-rolls.

H. V. Gates spoke of the difficulties of systematized accounting with the small clerical force necessarily employed by small plants. Robt. A. Foster stated that the Lewiston-Clarkston Company's policy likewise was toward simplicity of accounting. The necessity for simplicity was confirmed by Geo. Nixon. P. A. Bertrand emphasized the importance of adequate records of every transaction and the importance of standardizing forms.

Mr. McArthur outlined the details as to size of organization necessary for towns of different populations. J. M. Davidson spoke of the small percentage of slow accounts and the wisdom of leniency to farmers.

In closing the discussion Mr. McArthur dwelt upon the confusion caused by too many rules and regulations.

Meeting was then adjourned until 2 p. m., when J. M. Kincaid occupied the chair while M. C. Osborn and J. E. Davidson read their supplementary papers on

**"Extension of Electric Service Into Small Communities and Districts."**

**Mr. Osborn's paper was devoted to the reasons and methods for obtaining business in new and small suburban towns. Shows preliminary estimates of revenue, construction costs, and the actual results obtained after one year of service. Also gives a general outline of the company management in the suburban towns.**

**Mr. Davidson's supplement was concerned with electrically operated pumping plants in rural districts, especially touching on construction, operating costs and earnings, based on the actual experience of the Pacific Power & Light Company in serving rural customers. Further mention is made of rates, contract periods, and data which will be of special interest to central stations furnishing this kind of service.**

In discussing these two papers Arthur Gunn corroborated the statement that the modern farmer demands and is willing to pay for electrical conveniences. He spoke of the necessity of maintaining a business policy, once it has been established and commented upon the unsatisfactoriness of having the farmers report their own meter readings by post card. He also spoke of the high cost of making extensions and the necessity for a permanent basis of charge. He believes in a long-time contract based upon maximum demand and is anxious to get a satisfactory three-phase meter. Warning was given against making contracts with partnerships. where one partner is very likely to become delinquent.

G. D. Longmuir stated that in the Pasco district of the Pacific Power & Light Company during 1913 there were 107 small irrigation customers having an average connected load of 6.22 h.p., paying an average of $24.85 per h.p. year, representing a revenue of $6.20 and a connected load of ¼ h.p. to the acre. During 1914 the revenue will exceed $28 per h.p. year, with corresponding future increase as the farmer becomes more familiar with the apparatus. Further details of load conditions were given and the necessity of thorough familiarity with the farmers' business emphasized.

G. R. Hall stated that in the Hood River district, where there is little or no irrigation, that they figure on eight customers per mile of rural distribution line. They keep within the estimate of three years' gross revenue covering cost of construction by cheapening their construction. They figure an annual revenue of $30 from each rural consumer. It is advisable to have a representative of the company meet the individual farmers at least monthly.

H. S. Wells spoke of the care exercised in ascertaining the financial standing of the rancher. N. W. Brockett stated that long time contracts should be taken with the proviso that in case the rates are reduced the customer shall have the benefit of the reduction.

E. Baughm stated that the Pacific Power & Light Company installs indicating instruments on equipments of 25 h.p. and over. Arthur Gunn spoke of the success of the traveling bill man. The discussion was briefly closed by Mr. Osborn and Mr. Davidson.

H. B. Peirce, assistant commercial agent Washington Water Power Company, then read his paper on

**"Electrical Appliances."**

**This paper is intended to bring out the value of appliances and cooking loads to central stations. The appliances which have been found of proven value in securing this load are discussed in order, together with a brief discussion of the electric range and the electric hot water heater.**

P. A. Bertrand opened the discussion by suggesting that the tactics of the gas men in placing appliances in the home could be followed with profit by the electrical men. Emphasis was laid upon the benefits of standardizing appliances and the advantage of having baseboard receptacles installed in each room of a residence. He suggested that fans be handled on a rental system, with the option of applying the rental on the purchase of the fan at any time.

J. C. Henkle of Portland believes that a more thorough canvass of the lines of any company will place many new appliances. He stated that the Portland Railway, Light & Power Company had not yet found a satisfactory water heater from the standpoint of economical consumption. The company makes minor repairs free of charge with the purpose of keeping the appliance in use.

[To be continued.]

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E. B. STRONG, President.

Sworn to and subscribed before me this 24th day of September, 1914.

(Seal.) CHARLES EDELMAN,

Notary Public in and for the City and County of San Francisco, State of California.
(My commission expires April 7, 1918.)

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**The Exposition Technical Conventions**

Coincident with the definite announcement that the Panama-Pacific International Exposition will be held at San Francisco in 1915 comes the assurance that most of the technical conventions which have been scheduled for that period will also be in session, notwithstanding European disturbances.

Such conventions as those of the National Electric Light Association or the National Electrical Contractors' Association would of course be affected only to a minor degree. While the plans of the International Engineering Congress have been somewhat disarranged as regards foreign participation, energetic work on the part of the officials in charge has already assured the success of the congress which will be held as originally announced.

Equally definite plans have not yet been formulated regarding the International Electrical Congress, though the Pacific Coast committee is confident of its probable success. A decision will be reached regarding this matter early in October, and even if it is then considered best not to denominate the gathering as international in scope, it is more than likely that a national convention of the American Institute of Electrical Engineers will be convened. Many foreign papers are available and the meeting could be international in every feature but name.

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**Utility Cost Accounting**

Within the past few years it has been recognized that a mere financial accounting is not sufficient for the intelligent operation of any manufacturing business. Considering the generation of electric energy for light and power purposes as a specialized branch of manufacturing, operators now require itemized cost statements in order to increase the plant efficiency.

Most public utility accountants are fully cognizant of the important place that their departments occupy, especially since commission regulation has made uniform methods mandatory, and sometimes the accountant seems to be slightly jealous of his prerogatives and to resent any change that may be suggested by the engineering department.

Yet the demand for a scheme of accounts which follows the practical and technical workings of each part of a great power net-work is so reasonable and so closely in accord with modern methods of efficient management that it behooves the expert accountant to adapt his fiscal statements to meet operating needs. Superior to all objections as to greater complexity and the high cost of such refinement arises the necessity for finding existing inefficiencies and losses. Proper executive and administrative control cannot be exercised unless definite information is available not only as to financial results but also as to operating costs.

While the present tendency to base rates upon the cost of service is likely to be short-lived it is never-

theless now followed by many rate-making bodies. The usual accounting forms do not give information that differentiates between the cost of supplying business and residence consumers, long-hour power users and spasmodic users, and sometimes does not even distinguish between the costs of hydroelectric and steam generation.

For some time the central stations have been looking to the National Electric Light Association to prescribe a uniform classification of accounts which will be flexible enough to show the cost of the several classes of service which the company may render. The way for such action has already been paved by the Railroad Commission of Oregon, which, with the co-operation of the utility companies has adopted a classification which involves this principle. This has been accomplished by the addition of a few headings and by arranging for the distribution of the investment and a subdivision of the operating expenses that will enable the books to show the cost of each step in the natural order of the operation of the system. By this means it is possible to reach a closer approximation of a proper rate schedule for all classes of service. At Portland, Oregon, the Portland Railway, Light & Power Company employs a diagram of property location as the basis for apportionment in its scheme of graphic accounting.

The usual accounting system shows the cost of equipment and operation without reference to their proportionate cost for the particular class of service being rendered. At any subsequent period it is a slow and tedious process to determine this cost of service, whereas it would be a simple matter if the apportionment were made in the regular course of records.

Heretofore cost keeping has been regarded as merely a branch of accounting, whereas present requirements suggest that it should be the main object. By this means it will be possible for the operating man to check results and for the administrative end to know the how and why of the fiscal statement, which can be readily superimposed upon the cost records. Such a method of analytical accounting will show the purpose as well as the nature of each expense.

In order that favorable action be taken upon this suggestion it is necessary that each member of the N. E. L. A. use his influence in getting the Committee on Accounting to consider the incorporation of these items in its recommendation. The holding of this convention on the Pacific Coast next year will afford an excellent opportunity to personally impress the association with the desirability of this proposal, and, it is hoped, will lead to definite action.

The traditional and commendable conservatism of the accountant should not prevent his hearty co-operation with the progressive ideas of operating engineers anxious to know their unit costs. There need be no fear that the accountant will ever be superseded by the cost engineer for the subject is one which is being agitated in other advanced fields of accounting and the movement is in full accord with the belief that specialization makes for efficiency.

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**The Jobber as a Business Creator**

From time to time the question has been raised as to the need for the jobber in the electrical supply business and as frequently has this established method of distribution been proven an economic necessity. The modern jobber, especially under the conditions peculiar to the Pacific Coast, is far more than a middleman. His service to the consumer has been of unquestioned value and recently many innovations have been introduced whereby he can be of even greater service to the manufacturer.

The details of a proposal for creative sales work by the jobber are outlined in the paper by T. E. Burger published elsewhere in these columns. It is not the plan that such missionary work should supersede that of the manufacturer, but rather that it supplement and assist. The jobber localizes or intensifies the manufacturer's extensive campaign. This requires a coordination of effort and a mutual understanding so that one plan of action will not defeat the other.

The additional suggestion is made that the jobber should concentrate his efforts upon the product of one manufacturer, rather than scatter his energies upon similar products from competing manufacturers. The strongest argument in favor of such specialization is that it should accelerate the stock turn-over, experience having demonstrated that the more lines carried the slower the turn-over and consequently the higher the cost of doing business, especially in this Pacific Coast territory of great area and widely scattered customers.

Yet some specialties, particularly those requiring technical knowledge for their application, are not yet within the purview of the average jobbers' salesmen. The manufacturer requires an engineering representative to instruct the trade and the consumer regarding difficult features of installation. Frequently such products must be handled by an exclusive salesman. But in general, after wider use has caused such articles to become more and more staple, the jobber affords the more economical method of distribution. All economic progress is merely a process of converting superfluities into conveniences and conveniences into necessities. The methods for selling the electrical luxuries of yesterday are different from those for selling today's conveniences and must correspondingly change for tomorrow's necessities.

That this subject could be amicably discussed at the recent Del Monte meeting speaks well for the admirable spirit of harmony which now exists in this Western territory. There is naturally some difference of opinion on the subject and it certainly is a matter of congratulation that it could be discussed without recrimination. Yet no fair-minded man but will admit that no hard-and-fast rule can be prescribed to fit all conditions. Circumstances will ever alter cases.

# PERSONALS

**A. E. Brockway,** electrical contractor of Seattle, Wash., was a recent visitor at San Francisco.

**P. J. Aaron,** manager Fobes Supply Company, has returned to Seattle from a visit to California.

**H. W. Jacobs,** electrical merchant of Santa Rosa, Cal., has returned from a short business trip to San Francisco

**K. G. Dunn,** vice-president Hunt, Mirk & Company of San Francisco, has returned from a business trip to Seattle.

**H. W. Briscoe,** with the Wagner Electric Manufacturing Company of St. Louis, is at Los Angeles from St. Louis.

**E. E. Warren,** electrical contractor, Yuba City, Cal., was a business visitor at San Francisco the latter part of the week.

**L. R. Wylie,** manager Yosemite Power Company, Visalia, Cal., is at San Francisco to attend the annual meeting of his company.

**E. F. Holland,** manager of the Great Falls plant of the Montana Power Company, has returned to Great Falls from Seattle.

**L. F. Youdall,** manager Electric Machine & Equipment Company, Stockton, Cal., made a business trip to San Francisco recently.

**G. Douglas Jones,** electrical engineer state department of engineering from Sacramento, spent the latter part of the week in San Francisco.

**E. P. Cullinan,** electrical engineer for the Tonopah-Belmont Development Company, recently spent a few days on business in San Francisco.

**C. L. Dobyns,** illuminating engineer with the Sunbeam Incandescent Lamp Company, has established Pacific Coast headquarters at San Francisco.

**W. L. Neelands,** sales representative with the San Francisco office of the Western Electric Company, is again on the job, after a brief recreation in Sonoma County.

**S. W. Deitrich,** electrical superintendent for the San Joaquin Light & Power Corporation of Fresno, Cal., is expected to return from an Eastern trip early in October.

**C. E. Heise,** district manager of the Westinghouse Electric and Manufacturing Company, has returned to San Francisco from the district managers' meeting at Pittsburg.

**C. A. Whipple** has resigned as manager of the municipal light and water department of the city of Eugene, Oregon, to open an office as consulting and constructing engineer at Seattle.

**W. J. Gough** has succeeded **R. B. Talbot** as vice-president and superintendent of the Los Angeles and San Diego Beach Railway, which is electrifying its line between San Diego and La Jolla, Cal.

**G. R. Kinney,** formerly with the engineering department of the Railroad Commission of California, is now in charge of the statistical department of the San Joaquin Light & Power Corporation of Fresno, Cal.

**Victor Kuehn** has resigned as superintendent for the Levy Electric Company, San Francisco, to become manager of the construction department of the Gas & Electric Appliance Company, San Francisco.

**W. D. Thomas,** representative Electric Railway and Manufacturing Supply Company of San Francisco, is making a trip throughout the San Joaquin Valley. **H. F. Yost,** representing the same company, is covering Nevada.

**C. C. Craig** has resigned as commercial agent for the Northwestern Electric Company, Portland, Oregon, to become general sales manager for the Coin Machine Manufacturing Company, with headquarters in San Francisco.

**Carl W. Beaton,** formerly chief electrical inspector at Sacramento, is now acting city electrician, **Stanley Pearce** having recently resigned his position to become associated with J. C. Hobrecht, electrical contractor at Sacramento.

**R. L. Eldringham,** electrical engineer for the California State Accident Commission, has returned to San Francisco after an extended tour during the past three months over the lines of the various power companies of southern California.

**P. M. Longan,** treasurer and comptroller Mt. Whitney Power & Electric Company, Visalia, Cal., accompanied by **Fred G. Hamilton,** Eastern district manager, are in San Francisco to attend the annual meeting of the Yosemite Power Company.

**C. D. La Moree,** salesman with the Westinghouse Electric and Manufacturing Company, **Newton Graham** of the Holabird-Reynolds Electric Company, and **C. B. Hall** of the Illinois Electric Company, have returned to Los Angeles from a visit to Northern California.

**W. S. Heger,** Western director Busch-Sulzer Bros. Diesel Engine Company of St. Louis, has returned to San Francisco from a trip throughout the northwest and Salt Lake visiting several branches of his company and reports prospects much more promising than earlier in the year.

**Geo. J. Henry,** consulting enginer at San Francisco, has been admitted to practice before the United States Patent Office. His qualifications as an engineer and a number of years' experience in patent matters should particularly fit him for this class of work. This is in addition to the consulting and designing work, which he will continue as heretofore.

**J. O. Presbrey** has returned from the convention of the Holophane works of the General Electric Company. While there he effected arrangements whereby a new territory to be known as the Inter-Mountain territory has been created consisting of the states of Utah, Idaho, Wyoming, Montana, Colorado, New Mexico; and Spokane and El Paso. Mr. Presbrey will have charge of this territory with headquarters at Salt Lake City.

**Thurston Owens,** secretary of the San Diego, (Cal.) Gas & Electric Appliance Company, has been elected president of the San Diego Electrical League. Mr. Owens is a newcomer in San Diego and his election should dispel any ideas that it is necessary for one to be a "native son" to obtain recognition. Mr. Owens was formerly manager of the La Crosse (Wis.) Gas & Electric Company and has been in the public utility business for 15 years. He is the local secretary of the Illuminating Engineering Society, a Jovian, and several gas and electric associations. He has been a frequent contributor to the technical press.

**C. G. Pyle,** chairman of the Los Angeles Section of the American Institute of Electrical Engineers, has appointed the following committee to arrange for the entertainment and comfort of the electrical men who will visit Los Angeles during 1915: **B. F. Pearson,** general superintendent Southern California Edison Company, chairman; **C. S. Vance,** vice-president Los Angeles Gas & Electric Corporation; **E. R. Davis,** general manager Pacific Light & Power Corporation; **S. H. Anderson,** electrical engineer Pacific Electric Railway Company; **O. H. Ensign,** chief electrical engineer U. S. Reclamation Service; **Geo. A. Damon,** consulting engineer; **Max Loewenthal,** electrical engineer; **R. H. Monahan,** city electrician; **E. F. Scattergood,** chief electrical engineer Los Angeles Aqueduct Power; **J. A. Lighthipe,** electrical engineer Southern California Edison, all of Los Angeles.

## MEETING NOTICES.

### Sacramento Jovian League.

The Sacramento Jovian League held its regular luncheon on September 21, the chief topic of discussion being a Jovian theatre party or dance. Messrs. Beaton, Scoville and Dillon were appointed as a committee to take the matter in hand.

### Engineers' Club of San Francisco.

At the bi-weekly luncheon of the Engineers' Club of San Francisco on September 30, Fletcher M. Hamilton, state mineralogist, gave an interesting talk on the mineral resources of California.

### San Francisco Electrical Development and Jovian League.

The regular weekly meeting of the League was held Tuesday, September 29th at a downtown cafe. The subject of the day was San Francisco's Municipal Railway System, treated upon by Mr. Paul T. Ost, chief electrician of the system. No business was transacted as the meeting was devoted entirely to the speaker and his subject.

### National Convention Electric Vehicle Association.

The finishing touches are being applied to the extensive program of the fifth annual convention of the Electric Vehicle Association of America, which will be held Monday, Tuesday and Wednesday, October 19, 20 and 21st at the Hotel Bellevue-Stratford, Philadelphia. Many interesting addresses and topics for discussion have been arranged for both the morning, afternoon and evening sessions of the three days of the convention.

### Jovian Electrical League of Southern California.

The weekly luncheon of the League, held at Christopher's, Los Angeles, on September 23d, was hailed as "Industrial Los Angeles Day" and was attended by about 150 members and friends. After a few complimentary remarks on the enthusiasm shown by Jovian Briscow of St. Louis, and several good musical selections, chairman of the day, J. E. Tucker, introduced the speaker, G. A. Brock, chairman of the Industrial Committee, Chamber of Commerce, and Arthur W. Kinney, the Industrial Commissioner.

Mr. Kinney laid particular stress upon the tremendously important part which manufacturing plays in the up-building of a city. He ascribed practically all the best and most personally-beneficial growth of a large municipality to its factory products. Mr. Brock made an especial point of the necessity for co-operation, to secure the most far-reaching and lasting results in industrial development. He pointed out that this co-operation could extend all the way from that among kindred lines of business to mutual help by nations themselves in the industries. In this connection he scored the present government for giving "so much effort of late to the destruction of business."

In defining the importance of manufacturing, Mr. Kinney said:

"We are expending millions of dollars to make Los Angeles a world port and to increase our efficiency for commerce, both foreign and domestic. Expanding our facilities alone will not bring us the business that we so greatly desire. To get business, business must be given. Manufacturing alone will give the great cargoes that will bring a steady stream of gold to Los Angeles."

In this connection he contrasted Philadelphia with Galveston, showing that despite the fact that the latter was superior in its commerce, the former was by far the greater city on account of its manufacturing. He said that Los Angeles has all the requisites for a great and successful manufacturing city, such as raw materials, cheap fuel and power, efficient labor, transportation and markets.

The speaker drew a striking comparison between the value of a new manufacturing enterprise as compared with a convention. He pointed out that, despite the great virtue of conventions in attracting men and money here, the acquisition of a new factory employing forty men, which will mean the support of at least 200 people a year, accomplished the same benefits as a convention of 73,000 people here for one day, or 7300 for ten days. These figures are seldom, if ever, equalled, he said.

"Manufacturing, it is said, is the food source directly or indirectly of nearly nine-tenths of our nation's population," he continued. "Manufacturing has been profitable in all America's leading cities, and it has paid in Los Angeles. Home investments have made more money for Los Angeles people than investments outside."

He cited figures from the last national census report demonstrating that out of every dollar spent for Los Angeles-made products at least 43 cents remains in our city.

In his talk Mr. Brock gave a description of the industrial bureau and some of the things it has accomplished. "One of the enterprises of the bureau has been the establishment of a government supply and contract service for the purpose of bringing local manufacturers, jobbers and others into closer touch with the almost countless purchases by the United States government of supplies of every description," he said.

"The maintenance of this service has already resulted in our home establishments receiving many orders for government supplies. The 2000 or more factories of our city cover many articles purchased by the government, and from now on many orders will be received for them."

He pointed out that the spirit of co-operation has spread from business of kindred lines, among associations in general lines, then among communities for general welfare, then to co-operation by the general public, and finally to co-operation by nations. "We need to develop this spirit in our own government, which has unfortunately been giving so much effort, of late to the destruction of business," he said.

In speaking of industrial development in Los Angeles he said: "It is my opinion that $250,000 yearly spent in the upbuilding of our industries would be returned to us each year, in addition to increased assessed valuation made possible by new factories and homes erected for the new industries, as well as increased valuation to adjacent property, owing to the growth of industrial sections."

### Oregon Society Engineers.

Commencing with Monday, September 28th, there will be held weekly luncheons at the Hotel Benson, in Portland, Oregon, under the auspices of the Oregon Society of Engineers. There will be speakers provided for each luncheon, who will talk upon live subjects. The first luncheon will be held in the Crystal Dining Room, W. D. B. Dodson will speak on "Commercial Opportunities of the Present."

The first meeting of the society for the coming season was held in the Public Library building Thursday evening, September 24th. C. F. Blake, president of the Northwest Oil Burner & Equipment Company, expressed his ideas how the society could be made of more value to all members. He stated that he did not think the presentation of professional and technical papers alone could serve to hold an engineering society together. He thought that in addition to technical papers that if the society would meet at 6:30 informal dinners that this would promote good fellowship and call forth a better attendance. He also pointed out that the Oregon Society of Engineers should aid the library association by outlining courses of scientific reading based on the technical library. These courses to be made adaptable to the needs of the younger engineers.

J. C. Stevens, hydraulic engineer, pointed out the great necessity of general adoption of the metric system in this country, and that it must be adopted if this country expected to get the foreign manufacturing. He urged that the society put forth efforts to encourage the general adoption of the system and invite other technical societies to join them in the movement. He thought the best way to bring about this result would be for manufacturers to revise their catalogues and when adding new machinery—such as rolls—for steel mills, to make the additions to their equipment on the basis of the metric system. Using the old equipment for the home market.

H. J. Stocker, field engineer light and power department Portland Railway, Light & Power Company, spoke upon the

necessity of the society having permanent headquarters with a few rooms available for the use of out of town engineers.

In the case of Mr. Blake's ideas of an education reading course a motion was made and carried that a committee be appointed to look into this matter and report at the next regular meeting. This committee is to confer with the University of Oregon and see if the co-operation of its Extension Course could not be obtained.

In regard to both the adoption of the "metric system" and the "permanent headquarters" ideas, motions were made and carried to appoint committees to investigate those subjects.

The society unanimously endorsed W. B. D. Dodson for an appointment under the recent bill passed by Congress to allow the Secretary of Commerce to appoint five commercial attaches with the U. S. legations in foreign countries. Mr. Dodson has spent a number of years in foreign countries. At one time he was connected with the promotion and sale of automatic telephone equipment in China and Japan.

## MAZDA BUREAU ACTIVE IN CALIFORNIA CITIES.

The Mazda Bureau of General Electric Company is conducting an active co-operative campaign in the cities of Oakland, Alameda, Berkeley, Hayward, San Leandro, Fruitvale and Richmond for the exploitation of the trade-mark Mazda. The campaign centers about a large Mazda demonstration which is being maintained at Idora Park, Oakland, during the Alameda County Exposition and Carnival, which extends over a period of two weeks.

The Mazda Bureau has posted the cities mentioned with large attractive posters suggesting the meaning of the Mazda mark and connecting the Mazda demonstration with the distributors of Mazda lamps. The moving picture theaters are used to call the attention of the public to the Mazda demonstration and the window displays in electrical dealers' windows.

The direct personal co-operation of the Mazda Bureau has been extended to some 85 or 90 electrical dealers in the Alameda County cities through Mazda window displays installed and maintained by the bureau. This co-operative work has been at the service of distributors of all brands of Mazda lamps.

The campaign is in charge of Mr. H. H. Cudmore, Director of the Mazda Bureau, who is assisted by Messrs. F. J. Blaschke, in charge of publicity, and A. B. Bond and Clark Baker, field representatives.

## NEWS OF CALIFORNIA RAILROAD COMMISSION.

The Northern Electric Railway Company—Marysville and Colusa Branch, has filed an application requesting approval of notes previously issued amounting to $37,079.50.

The Sacramento & Woodland Railroad Company has filed an application requesting approval of notes previously issued amounting to $118,750.

The commission has issued an order granting the Marin County Electric Railways an extension of time until April 1, 1915, in which to sell the stock previously authorized for the construction of a street railway system in Mill Valley, Marin county.

## TRADE NOTES.

The installation of the electric driving machinery for the cables of the California Street Cable Railway Company, San Francisco, is progressing rapidly. The work is being done under the direction of F. W. Lamme, consulting engineer.

The Newberry-Bendheim Electric Company of Los Angeles, has closed a contract with the Griffin Car Wheel Company of Chicago, for all the wiring and motors for their extensive new plant at Vernon, Cal. This embraces about 700 h.p. in motors and all the wiring for this $300,000 plant is in conduits.

The electrical workers strike which has been brewing at Salt Lake City for the past two weeks was called on September 23rd as a result of the final refusal of the contractors to recognize in any way E. A. Wilcox as business agent of the workers. The electrical contractors all declare that there will be little delay in completing the contracts now on hand.

The school board at Murray, Utah, has recently let a contract for the complete electrical equipment of the domestic science department of the new Hillcrest High School. This will consist of 25-4½ in. Simplex 3 heat disc stoves equipped with a 1 pint saute pan and a 2 pint double boiler. The contract was awarded to the Inter-Mountain Electric Company.

J. W. Christensen of Fairview and C. A. Hammond of Moab, Utah, have recently placed an order with the Inter-Mountain Electric Company of Salt Lake City for a 50 k.v.a. generator with exciter and panel board direct connected to a Leffel water wheel and the necessary wires, cross-arms, transformers and distribution equipment to install an electrical distribution system in this city, a franchise for which was recently granted. They also propose to erect and operate a flour mill and an ice plant to be operated by this plant, as this city is badly in need of these two utilities.

The Underwriters' Equitable Rating Bureau of Portland, Oregon, has issued a circular calling attention to two forms of unapproved packing-house cord now appearing on the Portland market. The defect in one specimen is the absence of cotton braid on each of the conductors. The other specimen is defective in that no cotton or other winding is provided on the stranded conductor beneath the rubber insulation. This bureau will not sanction the use of nor approve any packing-house cord which does not comply strictly with the requirements of the National Electrical Code as given under Rule 54 and tabulated on page 105, edition of 1913.

## NEW CATALOGUES.

National Lamp Works of the General Electric Company has issued a First Reader on Series Circuits and National Mazda Lamps for Street Series Lighting, which contains sales arguments on High Efficiency Mazda Street Series Lamps.

"New Ideas in Window Display" is the subject of a serviceable and timely bulletin published by the Westinghouse Lamp Company. Illustrations and practical directions are given for preparing five different styles of window display for retail stores.

Bryant Electric Company is distributing a handsome bulletin about the Bryant Silent Call Signal System for Hospitals, as well as offices, department stores, public buildings, etc. Illustrations and descriptions are attractively presented of typical installations and wiring details are also shown.

The Westinghouse Electric & Manufacturing Company has recently issued the following publications: Electric Drive of Rubber Calenders, Leafit 3693. This publication deals with the advantages to be gained by the use of electric drive for this class of work, showing a number of illustrations of actual installations. Glue Pots and Glue Cookers, Folder 4293, show the method of installing an electrically heated glue pot and glue cooker, and the advantages to be gained from the use of same. Westinghouse Electric Drive for Flour Mills, is described in Folder 4287 in which some curves are given showing the load on a flour mill driven by electric motors. A complete equipment of these mills is given together with the advantages gained by this method of drive. Motor-Generator Sets, utilizing a direct-current generator and an alternating-current motor, are thoroughly described and illustrated in descriptive leaflet No. 3742. The advantages of this type of machine and its characteristics are described.

# INDUSTRIAL

## A NEW STRAIN INSULATOR SWITCH.

The Pacific Electric Manufacturing Company of San Francisco has recently designed a switch on which the line wires can be directly dead-ended. It may be equipped with one of several standard strain insulators, which can be quickly and easily removed and replaced by other standard strain insulators, without cementing any special parts, and solely by loosening three bolts.

As the blade moves in a line parallel to the line wires and no conducting members extend to either side, the switches are spaced no further apart than the standard centers of the line wires. The switch is retained in the closed or open position by gravity. The strain insulators are immovable, and no strain, either mechanical or electrical, is added to their customary functions as strain insulators. The arc is drawn far above the porcelain.

The switch is group controlled by a square rocker shaft, having bearings bushed with brass, and the three units can be set at any position on this shaft, making this switch one that is particularly easy to install.

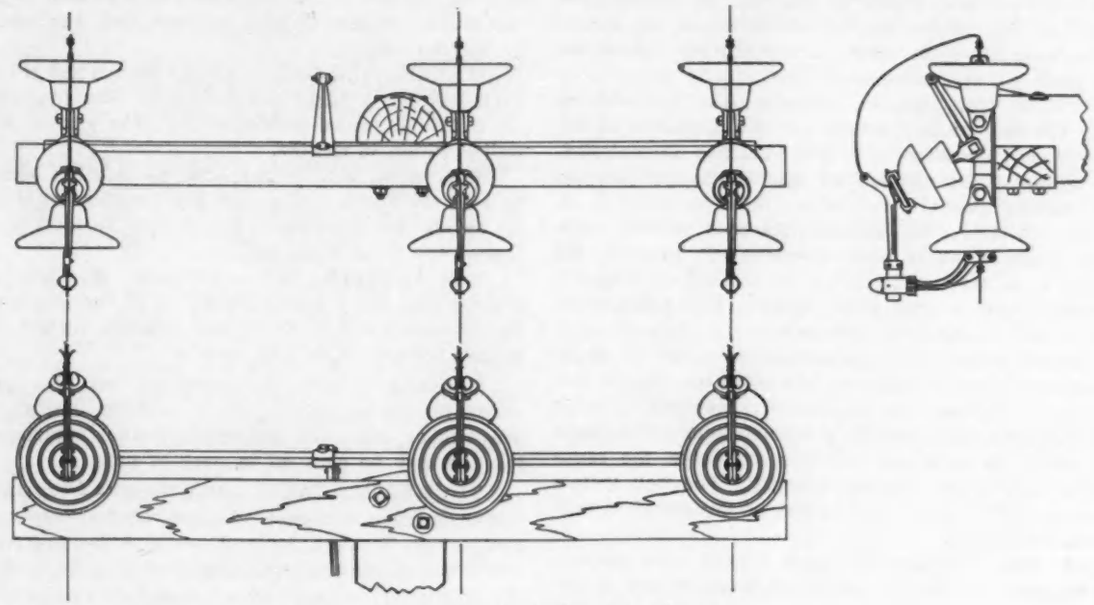
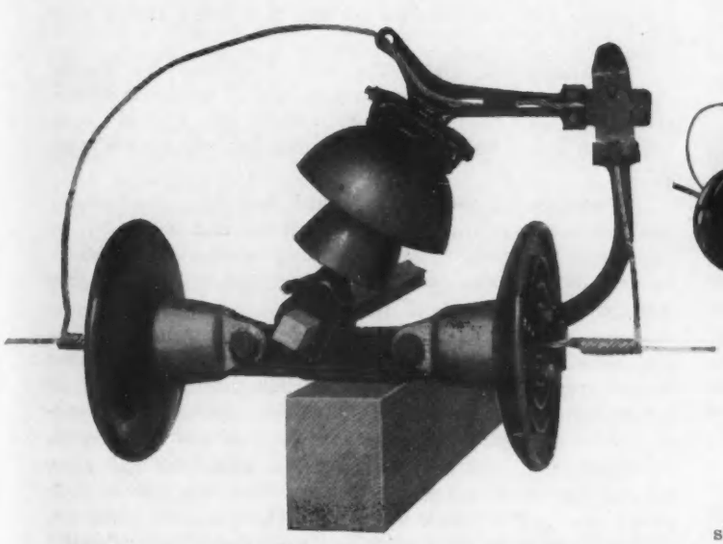
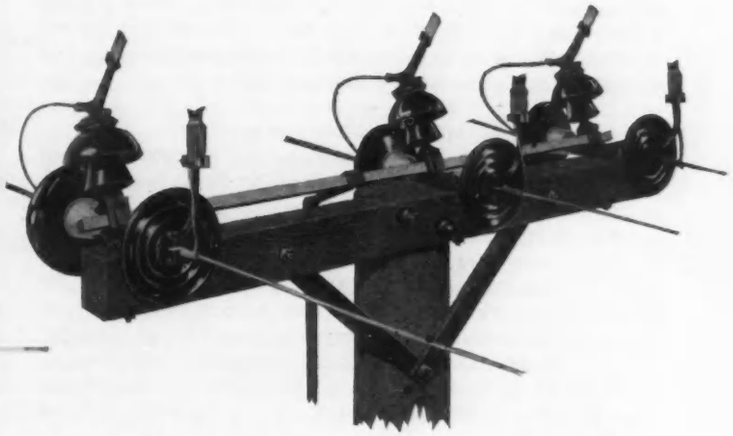


Diagram of Strain Insulator Switch.



End View of One of the Units of the Strain Insulator Switch Showing Adaptation of Standard Type of Insulator.



Strain Insulator Switch in Open Position on Pole.

All wrought iron and malleable parts are galvanized or sherardized. This switch can be furnished fully equipped with insulators or equipped with the pin insulators only, the strain insulators to be furnished by the purchaser. It can be installed on a single crossarm of the purchaser's standard length.

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## TRADE NOTE

With Fawcett Robison as designer, the committee on electrical display, of Los Angeles, with Secretary Zeehandealer of the Merchants' and Manufacturers' Association as its head is arranging for the construction of fifteen electric floats for use in all parades in 1915. These floats will be mounted on street car tracks and will depict allegorical and other scenes. Reinforced by some of the Southland's fairest, these trucks will make attractive features for convention parades.

# NEWS NOTES

## FINANCIAL.

LOS ANGELES, CAL.—Bonds in the sum of $281,250 have been voted at Arcadia for improvements. Of this issue $131,250 will be spent to develop the municipal water plant.

GLENDORA, CAL.—Bonds in the sum of $37,500 have been voted by the citizens for the acquisition of the second unit of the domestic water plant. A distributing system and pumping plant will be purchased at once.

SAN FERNANDO, CAL.—A communication has been received by the city council asking for the appraisal of the two local water plants by the State Railway Commission, and the calling of an election to vote bonds for the purchase of the two plants.

PASADENA, CAL.—No decision has been reached as to when the proposed water bond election will be held, the suggestion having been made that it be delayed until spring. The estimated cost of the water system, $289,000, is also expected to be considerably reduced.

RICHMOND, CAL.—The proposition to bond the Richmond municipal water district for $2,500,000 to bring a supply by pipe line from the Sacramento River at Tolands Landing has been defeated for a second time. The opponents in the main were opposed to river water, the sentiment being in favor of a mountain supply. The well system by which the city is now supplied can be developed to supply a large population.

AZUSA, CAL.—Preparations for a $55,000 bond election to be called early in October are being made by City Attorney F. M. Steele for a new water system costing $35,000 and a new lighting plant, costing $20,000. The lighting system will include lights along Foothill boulevard, Azusa avenue and Center street, which will be arranged according to best methods obtainable and will result in the city being as well lighted as any other in the eastern district.

## INCORPORATIONS.

LOS ANGELES, CAL.—The San Luis Electric Company of Los Angeles, $50,000, subscribed $5 by F. W. Morrison, H. F. Charles, W. W. Butler, J. P. Fulmer.

SACRAMENTO, CAL.—Amended articles of incorporation have been filed in the county clerk's office by the Sacramento Inter-Urban R. R. Company in order to cut the term of incorporation from 50 years to September 30th, so as to go out of business. The incorporators are W. N. Williamson, E. W. Johnson, Marshall Diggs, R. C. Waring, C. E. Hollister, J. T. Elliott and A. D. Kildahl. The company was originally formed to build a line to Roseville through the Haggin Grant

## ILLUMINATION.

NORWALK, CAL.—An electric lighting district will be established here as soon as it can be done under the law.

OLYMPIA, WASH.—The Crescent Oil Company will apply to the city council of Olympia for a franchise to serve the city with gas.

LODI, CAL.—The Lodi Gas Company will commence in a few days making a 600 ft. extension to its mains on South Hutchins street.

SPOKANE, WASH.—The contract for a gasoline gas plant to be installed at Whitworth college has been let to Thomas McCart of Spokane.

PORTLAND, ORE.—Permission has been granted by the war department to the Portland Gas & Coke Company to lay mains across Willamette below Milwaukie.

DEMING, N. M.—The Phelps-Dodge Company will install a power plant at once. The engines will be Diesel make. The work will be in charge of Albert Kohler.

YONCALLA, ORE.—An election will be held here in December to vote on the question of additional city indebtedness for the installation of an electric light system to cost $6000.

ABERDEEN, WASH.—The revised franchise giving the right to sell gas in the city limits of Aberdeen to L. H. Burnett and a company of local business men, has been accepted by Mr. Burnett.

WARRENTON, ORE.—The city council has granted to the Pacific Power & Light Company a 30 year franchise to supply light and power in Warrenton. The system must be installed within 18 months.

WILBAUX, MONT—A special election has been called to vote on the question of granting a franchise to Henry Zolphi for an electric light and heating plant here. The estimated cost of the plant is $20,000.

LOS ANGELES, CAL.—The board of public works has ordered that the lights be turned on at the ornamental lighting systems of the city fifteen minutes earlier during the months from October 1 to April 1.

TACOMA, WASH.—An ordinance has been passed providing for the equipment of all buildings that are piped for gas with an automatic gas cock, or other appliance whereby the gas may be shut off in case of fire.

THOMPSON, FALLS, MONT.—The Thompson Falls Power Company has awarded a contract to Boomer & Hughes, contractors, Spokane, for rock work at the power house site and lowering the bed rock to the final floor for machinery.

OLYMPIA, WASH.—The Crescent Oil Company has made formal application to the city council for a franchise to lay gas mains in the streets of the city of Olympia and furnish the people with gas from an oil well now being drilled near this city.

WARRENTON, ORE.—The council granted the Pacific Power & Light Company, Astoria, a 30 year franchise to furnish power and light in the city. Work will probably commence at once. The cost of the extension will approximate $50,000

SPENCER, IDAHO.—The public utilities commissioner has granted certificates of convenience and necessity to the Wood Livestock Company, F. J. Hagenbarth, president, to operate an electric generating plant and distributing system here.

LOS ANGELES, CAL.—The board of supervisors of Los Angeles county, Cal., will receive bids to October 13th, for installing and maintaining an addition to the system of street lighting in Lankershim Lighting District, in accordance with specifications on file with the board of supervisors.

CENTRALIA, WASH.—An electric franchise has been granted to the Independent Electric Company for a high power line from Winlock to Toledo. The franchise gives the company the right to run its line over the Winlock-Cowlitz road to the Cowlitz store, and over the Cowlitz-Olympia road and the John Tucker road.

LOS ANGELES, CAL.—The Pacific Light & Power Company wants to place a substation in the northwestern part of the city, this being necessary to increase the service in that section and in Hollywood. Members of the city council have made an inspection of the proposed location and probably will recommend the issuance of a permit.

PASADENA, CAL.—An ordinance has been adopted by the city commission fixing a standard of heating value of gas and a maximum price thereof, and requiring persons, firms or corporations furnishing gas to refund to property owners under certain conditions cost of connections to gas mains required to be made before streets are made.

LOS ANGELES, CAL.—The city council has appropriated $3000 a month for five months for the appraisal of property of the three Los Angeles gas companies. The consensus of opinion of the councilmen was that the making of a new and independent appraisal for the city's use in combatting the suits of the gas corporations against the enforcement of the 40-cent rate for natural gas would settle the doubt in the public mind as to the adequacy of the valuations made by the board of public utilities.

## TRANSMISSION.

VIRGINIA CITY, NEV.—The Truckee River General Electric Company will begin the extension of its power line from Line Grove to Rockland in Lyon county within a few days.

TONOPAH, NEV.—A contract has been closed by Nelson Bros. with the Nevada-California Power Company for the extension of its power line to Manhattan, a distance of 14 miles. Actual construction on the line will begin in a few days.

OCEANSIDE, CAL.—The Southern Sierra Power Company, with headquarters in Riverside, has decided to extend its high power electric wires to Oceanside, connecting up with the system at Elsinore, and tapping Fallbrook and other intermediate points. Active work will begin on the proposition as soon as financial conditions improve.

ROCHESTER, NEV.—The Rochester Mining & Milling Company has signed a contract with the Nevada Valleys Power Company for electric power for its new mill. The town of Rochester will be supplied with electricity, as the building of the power line was contingent on the signing of the contract with the Rochester mines people.

## TRANSPORTATION.

SAN FRANCISCO, CAL.—Arrangements have been finally made with the old Geary street Railway Company to stand the cost of removing the rails and cable slot from Fifth avenue from Pt. Lobos avenue to Golden Gate Park.

SAN FRANCISCO, CAL.—The annual meeting of the stockholders of the Northern Electric Railway Company took place September 28th, the following board being re-elected: L. E. Hanchett, chairman; Leon Sloss, president; Percy Morgan, John McKee, John Drum, Louis Sloss and W. P. Hammon.

SAN RAFAEL, CAL.—Condemnation suits have been commenced here by the recently organized California Terminal Railway Company against Julia C. Bodkin, Salvador Pacheco, the Belvedere Land Company, the McNear Company and the Mt. Venice Company, all large Marin county land owners. Each suit sets out that the lands are desired for trackage purposes by plaintiff corporation, which is about to build a railroad from San Francisco to Sacramento.

SAN FRANCISCO, CAL.—City Engineer O'Shaughnessy has submitted detailed plans for certain improvements at the foot of Market street along lines decided upon at a conference between Mayor Rolph and other representatives of the city and the Board of Harbor Commissioners. The cost of the improvements is estimated at $503,000. They contemplate the opening of a new street on vacant lots 137:6 feet south of Market street, from Steuart street to the Embarcadero. This will admit of looping Market street cars around the new block that will be formed, thus materially relieving the congestion at the foot of Market street during the exposition year. The estimates of cost include the following items: Cost of land for new street, $380,000; rearranging of street car tracks and paving of new street, $49,000; foot-bridge on north side of Market street to second story of Ferry building, $28,000; foot-bridge on south side of Market street to Ferry building, $31,000; changes necessary to Ferry building, $15,000.

## TELEPHONE AND TELEGRAPH.

LOS ANGELES, CAL.—September 20th fire broke out on the third floor of the Pacific Telephone & Telegraph Company's exchange on Hill street, causing a loss of $1000.

VENTURA, CAL.—The Pacific Telephone & Telegraph Company has rented one-half of the Day building at Ventura as a store room and will immediately begin extensive improvements on lines between Ventura and Santa Barbara.

WILLOWS, CAL.—At a meeting here recently of the stockholders of the Glenn County Telephone Company, a committee was appointed to inquire into the business of the company. It is the belief that if the stockholders will agree to the price the plant will in the near future be turned over to the Pacific Telephone and Telegraph Company.

PORTLAND, ORE.—The Pacific Telephone and Telegraph Company for Portland and vicinity plans the expenditure of $131,992 for extensions. The improvements will include 600 ft. of 22 gauge relief cable, 10,000 ft. of underground cable, pole line and aerial cable, toll cable at Hood River, and repair work. A large amount of work will be carried on along the highways.

SANDPOINT, IDAHO.—Sandpoint patrons of the Interstate Telephone Company may now have a long-distance connection with the Bell phones in Spokane. The cut-over from the Interstate to the Bell system in this city was made recently. This connection was made possible through the sale of the long distance lines of the Interstate Utilities Company. The new company is organized to engage in the telephone business in Spokane with a capital of $1,000,000, by Philip Hamlin of Denver.

## WATERWORKS.

SAN DIEGO, CAL.—The city council has directed the finance department to advertise for bids for material required in installing a new pipe line from Bonita. Steel pipe will be used.

LOS ANGELES, CAL.—Chief Engineer Mulholland of the aqueduct bureau announces he will prepare plans immediately for the distribution of the aqueduct water for irrigation purposes in San Fernando valley.

PASADENA, CAL.—The city commissioners have authorized the city clerk to advertise for bids at once for 350 lengths of four inch cast iron class B pipe; 300 lengths of 6 inch cast iron class B pipe, and 125 lengths of 8 inch cast iron class B pipe, together with fittings, to be used for new line in Hill avenue.

SPOKANE, WASH.—Petitions asking the city to grant municipal water service to the large district in the northeastern part of the city which now is served by a private water system, formerly operated by F. S. Barrett & Company, have been put in circulation by residents along Nebraska, between Nevada and Morton. It is figured that about 3 miles of water mains would be needed for this section

HONOLULU, H. T.—Lieutenant Colonel E. B. Cheatham, chief quartermaster of the Hawaiian Department, has received instructions regarding the Fort Kamehameha water system, but nothing regarding money for other permanent construction on the Island. The Kamehameha water project is a fairly large item in itself, the estimates calling for $100,000, which has been made available, but it is only one item of the general construction scheme. Just how much money will be spent here this year, and for what purposes, will not be definitely known until the advices are received from the war department. Work on the new twelve-inch well at Port Shafter, which is to supply the artillery post near Pearl Harbor, has begun, according to the department quartermaster. The well will be drilled as far as necessary, probably 400 feet. For the completion of the project which consists of piping the water to Kamehameha, about six miles and through the post, bids will be advertised for during the next 30 days. This work probably will be done by contract.

# ALPHABETICAL INDEX TO ADVERTISERS

**The letter and number before each name are used in the classified page opposite**


A-1 American Ever-Ready Works of National Carbon Co....
Los Angeles; 755 Folsom Street, San Francisco; Seattle.

B-1 Benjamin Electric Manufacturing Co.....
Rialto Bldg., San Francisco.

B-3 Blake Signal and Manufacturing Co.....
680 Howard Street, San Francisco.

B-5 Bridgeport Brass Co.....11
(See Pierson, Roeding & Co.)

B 7 Busch-Sulzer Bros.-Diesel Engine Co..... 3
Rialto Bldg., San Francisco.

C-1 Century Electric Co.....12
614 South Grand Avenue, Los Angeles; 56 Natoma Street, San Francisco; Seattle; Spokane.

C-2 Colonial Lamp Works.....
444 Market Street, San Francisco.

C-3 Crocker-Wheeler Co.....
Title Insurance Bldg., Los Angeles; Salt Lake City; First National Bank Bldg., San Francisco; Seattle.

C-5 Crouse, Hinds & Co.....
Chicago. Ill.

C-4 Cutler-Hammer Manufacturing Co.....15
579 Howard Street, San Francisco; Morgan Bldg., Portland, Ore.; San Fernando Bldg., Los Angeles.

D-1 D. & W. Fuse Co.....12
(All Jobbers.)

D-2 Dearborn Drug and Chemical Works.....11
355 East Second Street, Los Angeles; 301 Front Street, San Francisco.

E-1 Edison Lamp Works of General Electric Co..... 14
Rialto Bldg., San Francisco.

E-2 Edison Storage Battery Supply Co.....11
441 Golden Gate Avenue, San Francisco.

E-3 Electric Agencies Co.....
247 Minna Street, San Francisco; Gentral Building, Los Angeles.

E-4 Electric Storage Battery Co.....16
Pacific Electric Bldg., Los Angeles; Spalding Bldg., Portland; 118 New Montgomery Street, San Francisco; Colman Bldg., Seattle.

F-1 Fairbanks, Morse & Co.....
Los Angeles; Portland; 651 Mission Street, San Francisco; Seattle; Spokane.

F-2 Fort Wayne Electric Works of G. E. Co.....
Rialto Bldg., San Francisco; Colman Bldg., Seattle.

G-1 General Electric Co.....4-5-14
124 W. Fourth Street, Los Angeles; Worcester Bldg., Portland; Rialto Bldg., San Francisco; Colman Bldg., Seattle; Paulsen Bldg., Spokane.

H-1 Habirshaw Wire Co.....
(See Western Electric Company.)

H-2 Hemingray Glass Co.....11
330 So. L. A. Street, Los Angeles; 345 Oak Street, Portland; 807 Mission Street, San Francisco.

H-3 Hoaglund-Hulse Electric Co.....
1707 Naud Street, Los Angeles.

H-4 Holophane Works .....
Aronson Bldg., San Francisco.

H-5 Hunt, Mirk & Co..... 6
141 Second Street, San Francisco.

H-6 Hubbard & Co.....
Rialto Bldg., San Francisco.

I-1 Indiana Rubber and Insulated Wire Co.....
807 Mission Street, San Francisco.

K-1 Kellogg Switchboard and Supply Co.....
Aronson Bldg., San Francisco.

K-3 Klein & Sons, Mathias .....11
579 Howard Street, San Francisco.

K-4 K-P-F Electric Co.....16
37 Stevenson Street, San Francisco.

L-1 Leahy Manufacturing Co.....
Eighth and Alameda Streets, Los Angeles.

L-2 Locke Insulator Manufacturing Co.....11
(See Pierson, Roeding & Co.)

M-1 Mannesmannrohren-Werke .....
Rialto Bldg., San Francisco.

M-2 McGlauflin Manufacturing Co.....
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M-4 Morse Chain Co.....13
Monadnock Bldg., San Francisco.

M-3 Moore & Co., Charles C.....
Van Nuys Bldg., Los Angeles; Spalding Bldg., Portland; Kearns Bldg., Salt Lake City; 40 First Street, San Francisco; Mutual Life Bldg., Seattle; Santa Rita Hotel Bldg., Tucson.

N-1 Nason & Co., R. N.....
151 Potrero Avenue, San Francisco.

N-2 National Conduit & Cable Co., The.....
Trust and Savings Bldg., Los Angeels; Rialto Bldg., San Francisco.

N-3 National Lamp Works of G. E. Co.....
(All Jobbers.)

N-4 New York Insulated Wire Co.....12
629 Howard Street, San Francisco.

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P-7 Pittsburgh Piping & Equipment Co.....16
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S-1 Schaw-Batcher Company, Pipe Works, The.....
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S-2 Simonds Machinery Co.....
117-19-21 New Montgomery Street, San Francisco.

S-3 Simplex Electric Heating Co.....16
612 Howard Street, San Francisco.

S-4 Southern Pacific Co.....12
Flood Bldg., San Francisco.

S-5 Sprague Electric Works of G. E. Co.....
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S-6 Standard Underground Cable Co.....16
First National Bank Bldg., San Francisco; Hibernian Bldg., Los Angeles; Yeon Bldg., Portland; Central Bldg., Seattle, Wash.

T-1 Thomas & Co., R.....
(See Western Electric Co.)

V-1 Van Emon Elevator Co.....
56 Natoma Street, San Francisco.

W-1 Wagner Electric Manufacturing Co.....16
Rialto Bldg., San Francisco.

W-2 Western Electric Co.....
119 East Seventh Street, Los Angeles; 507 Sixteenth Street, Oakland; 680 Folsom Street, San Francisco; 907 First Avenue. So., Seattle.

W-4 Westinghouse Electric and Manufacturing Co.....
50-52 East Broadway, Butte; Van Nuys Bldg., Los Angeles; Couch Bldg., Portland; 212 So. W. Temple, Salt Lake City; 165 Second Street, San Francisco; Central Bldg., Seattle; Paulsen Bldg., Spokane.

W-5 Westinghouse Machine Co..... 6
141 Second Street, San Francisco.

W-6 Westinghouse Lamp Co.....
(See Westinghouse Electric and Manufacturing Co.)

W-7 Weston Electrical Instrument Co.....
682 Mission Street, San Francisco.

W-8 Western Pipe & Steel Co.....
444 Market Street San Francisco; 1758 North Broadway, Los Angeles.